NOVEMBER, 1953

TOOLING and PRODUCTION

The Magazine of Manufacturing Management

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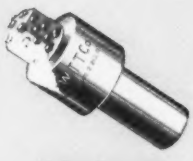

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INDUSTRIAL DIAMONDS

The Man Who Swallowed a Fortune

"Here," shouted Seigneur de Sancy to his bodyguard. "Here are the marks of the melée. Find my poor Pierre and there, I know, you will find the diamond."

When they found the grave in the forest, they found, too, that the brave old retainer, carrying the great jewel to King Henry IV of France (so that he could pawn it to finance his armies) had foiled the robbers at the cost of his life. When his stomach was slit open, there lay the Sancy diamond.

For lending his diamond to France, Henry made de Sancy ambassador to the court of Queen Elizabeth of England, who liked the jewel so much that she bought it. It passed to Charles I, who lost his head on the block, and, later, to James II, who fled to France after a disastrous defeat and sold the Sancy to Louis XIV for $125,000 —a fancy price in those days for a diamond of 53½ carats.

During the Revolution, it was stolen with the Crown Jewels of France, found weeks later in a gutter in the Champs Elysées, quickly stolen again, re-discovered in 1828 when it was sold to Prince Demidoff of Russia for $100,000. Today, it is said to be back in India, where it was originally found, probably a thousand years ago.

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TOOLING and PRODUCTION

The Magazine of Manufacturing Management

formerly
Tool-Die-Machine PROGRESS 1934-1941
TOOL & DIE JOURNAL 1941-51

Vol. XIX—No. 8 November, 1953

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They have the influence that enables them to adopt the ideas and the processes which TOOLING and PRODUCTION describes in every issue AND the authority to recommend, to specify and/or to buy everything that may be needed to reduce costs, increase production or improve quality. These men for whom, each month, our editors seek out or write TOOLING and PRODUCTION'S meticulously accurate stories of "Know-How" and "Tell-How" are T & P's exclusive Cycle of Buying Influence (CBI) in their plants.

Every copy is directed to these men by name, by title and by company address. Please see our CCA verification.

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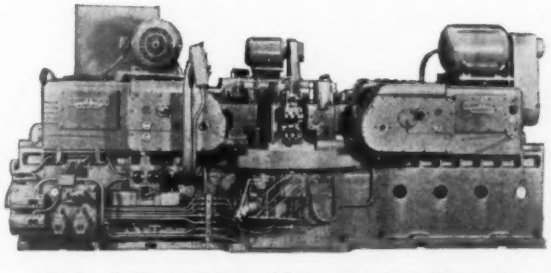
Write, wire or phone the Special Machinery Division, Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.



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Talk of the Month

Conveying Machinery And Approach To Automation

by Otto Svoboda
Sales Manager

THE E. W. BUSCHMAN CO., INC.
Cincinnati, Ohio

WE HAVE all heard statements or read articles of where, how, and when the mechanization of the world started; how the Egyptians used rollers to move the heavy stones into position to build the pyramids; of the invention of the wheel that permitted the oxen to haul heavier loads on carts; and of the first ball bearing used by the Romans. All these things, and many other progressive developments of mechanization are recorded in our libraries of sciences.

Today we can say our advancement has been a million fold or more. Many individuals feel there is little left for future development of the sciences. Looking forward, and trying to get a focus on the future, we can very easily say we have very much to do, and opportunities are unlimited. We can double, triple, or quadruple our past advancement. Many of us, before our time expires on this earth, will see vast advancements now considered "pipe dreams" by many of our fellow men.

This brings us to our present era, headlined by atomic energy, man traveling at speeds faster than sound — circumventing the earth through the air in the time element of hours, hydrogen force now greater than that of the atom, television and, too, the current new subject—Automation—for industry.

Automation, as we should understand it, means to automatically handle objects, parts or materials, through their development by mechanical means at

. . . *Continued on page 14*

This article is adapted from a paper delivered by the author before the 1953 ASME Fall Meeting, Rochester, New York.

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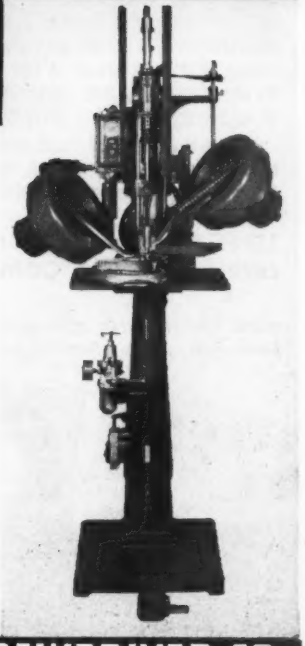

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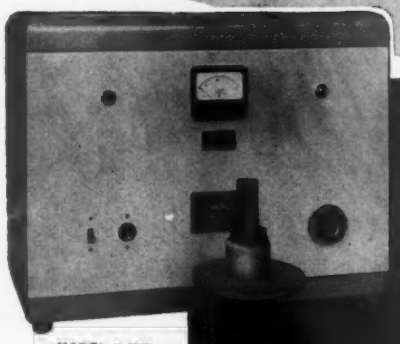

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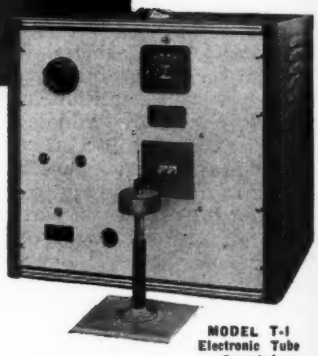

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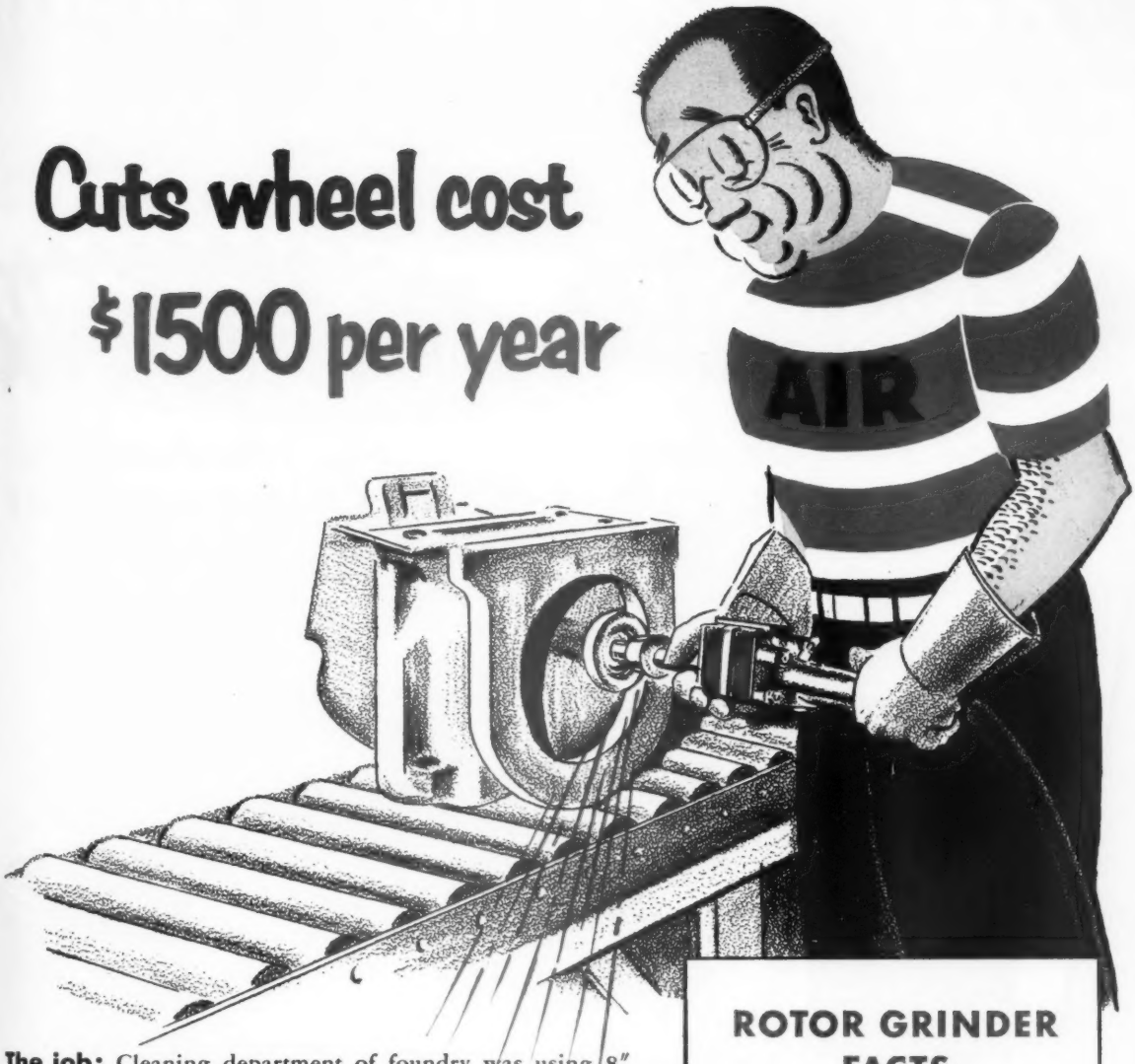

The job: Cleaning department of foundry was using 8″ wheels with 4500 rpm grinders. When worn down to 5″ or 6″, wheels lost surface speed and metal removal dropped off. Wheels were laid aside or thrown away at this point.

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Others from 3100 to 20,000 rpm. Straight or spade handles. Ask for Catalog No. 38.

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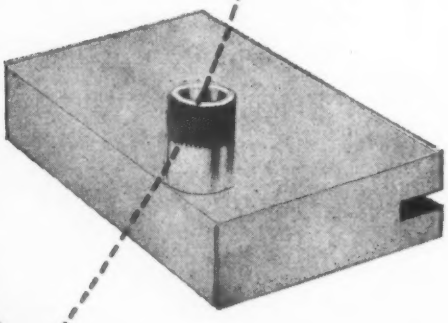

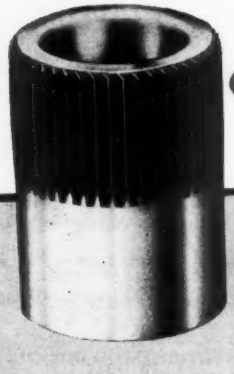

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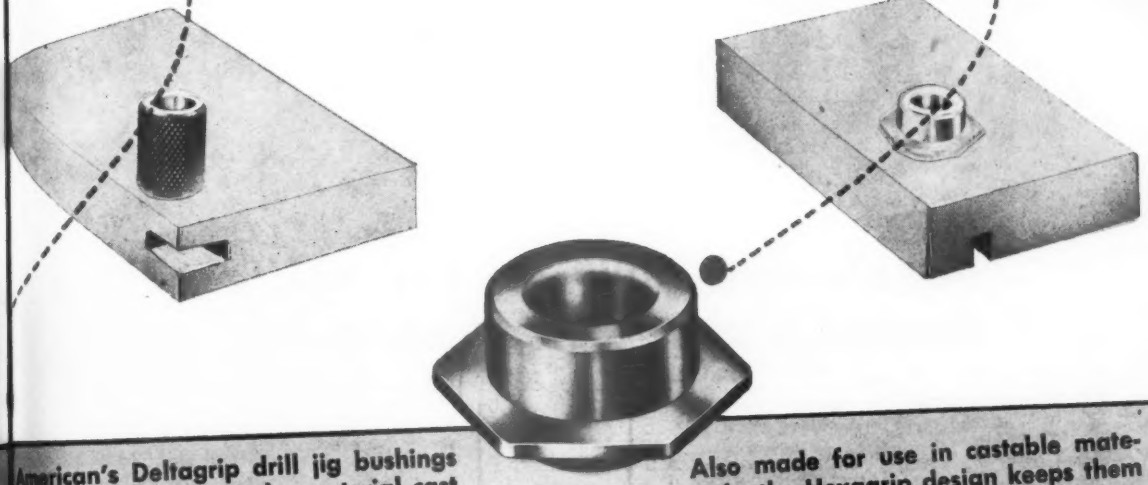

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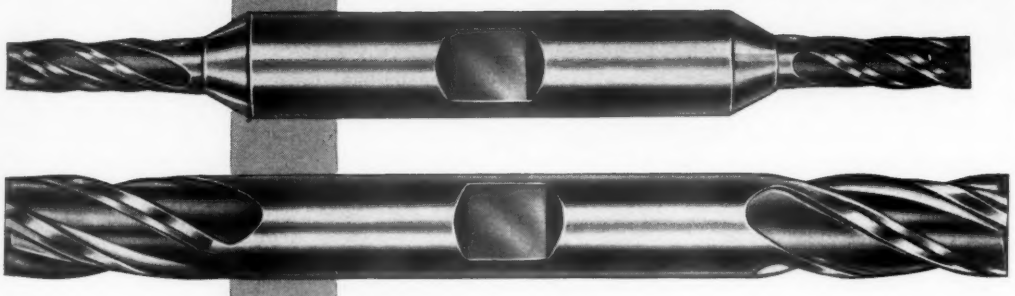

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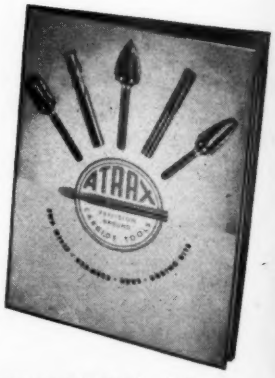

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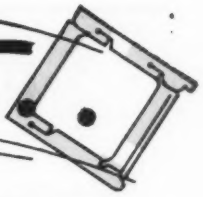

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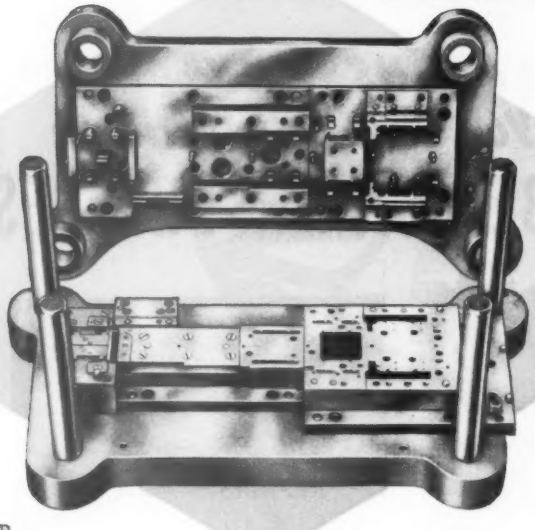

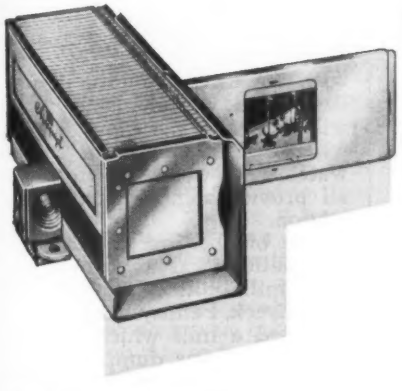

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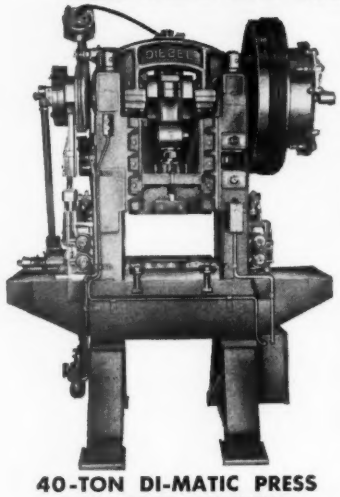
Precision Dies

6 REASONS WHY You Should Investigate DIEBEL PRECISION-BUILT AUTOMATIC PRESSES



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PRESSES

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CIRCLE INFORM-A-GRAM KEY NO. 14

. . . Month's Talk, from page 7

predetermined production speeds, to eliminate the variable inefficiencies of the human element.

Basically, conveyors are the prime mechanism to perform automation because you must convey, handle or move objects or materials into position.

Originally conveyors were applied to carry material from one operator to another. Then it was determined that some operations could be performed without removing the material from the conveyors. It also was determined some operations could be mechanically independent of an operator. It was found that conveyors could incorporate many mechanical movements of positioning, turning, tumbling, timing, automatic pick-up and discharge of parts, counting, sealing, wrapping, stacking and — without realizing it — developed automation. Many of these operations are simple and are being done every day in countless plants on many products. The automation we want to do from now on will be more complex and require new designs, and many new types of conveyors.

Some will have to be built with the highest degree of precision and workmanship; some will be heavy and bulky; others will be light and small as the watches we wear; but they will all provide some type of automation.

One of the first attempts of automation was Oliver Evans' flour mill built in 1783 at Red Clay Creek, Pennsylvania. Evans designed a mill which handled grain as it was dumped out of the farmer's wagon, through the entire process to make flour from wheat or rye, corn meal from corn, etc. Human hands did not touch the grain until it came out a finished product.

He received a patent for his design of the mill. The variety of conveyors which he used to handle the grain were screw conveyors, bucket elevators, belt conveyors and gravity chutes, which handled the grain through the process of cleaning, cracking and the final grinding, until finally it dropped in the bag—finished —ready for the farmer to take home.

Monorails were the predecessors to some of our present conveyors. A short time ago I saw an early copy of "Harper's Weekly," describing a meat packer's new

monorail system, illustrated with an etching, of mass dressing of hogs. They installed a monorail which developed into what today is known as the butcher's rail, from which they suspended the hog and it was passed from one butcher to another, each doing a different dressing or trimming operation, until the hog was completely dressed, quartered, and run into the cooler for storage.

This monorail was designed because the desire was to increase production, reduce cost, and improve the quality. The increased production was accomplished since the carcass hung in a position making it easier to position it in less time, and requiring less energy to perform each trimming operation. Since each man trimmed only one part of the carcass, he became more efficient. He conserved his energy because he had practically no lifting to do, and the time saved in handling was used to trim more hogs. The improved quality came from the more expert cutting, so the pork when displayed for sale was uniform in appearance and more appetizing.

This same theory is followed in general industry for the same reasons of efficiency and quality. We can assume the next idea was to apply power to the movement of the parts on the monorail, to further save energy, and to time the operation, making it necessary for the operators to keep up with the predetermined production speed. This made it easy to spot the operation that was slow and was holding up production due to improper timing or inefficiency of the operator or equipment.

The manufacture of tin cans has progressed to what we can, at the present time, class as advanced automation.

Cans today, starting with the flat sheet of tin plate, are being manufactured at rates up to 300 or more per minute, all positioned mechanically for progressive operations.

The flat sheet, or blank, is fed into the bodymaker which trims the sheet and rolls it into the body diameter, forming the seam and soldering it before it drops off the end of the bodymaker anvil into a chute. The chute feeds it into a double belt elevator (which is a vertical conveyor). The can bodies come off the anvil lengthwise, but must

. . . *Continued on page 18*

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Low-cost, high-efficiency grinding depends largely on careful wheel selection. Why take a chance? Choose safely with the help of Simonds bulletin on grinding wheel selection. It describes wheels for a wide range of jobs, gives recommendations for various types of materials . . . and lists specifications for easy ordering. Complete line has everything you need for roughing, finishing, cutting off, sharpening and polishing . . . everything including mounted wheels and points, segments and abrasive grain.

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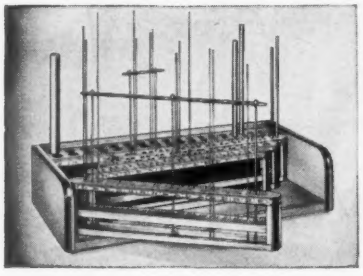
CIRCLE INFORM-A-GRAM KEY NO. 15

inexpensive

. . . Money Saving Accessories For Your Plant

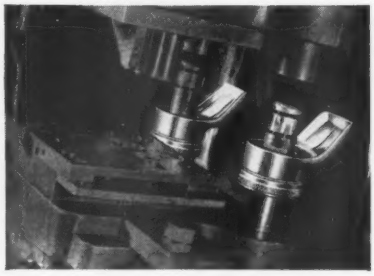
Each of the accessories illustrated and described below was designed and built for a definite need and used in our own plant before being offered to industry. They require a relatively small investment, yet will save you money every day. For further information, write for the folder offered below.

DRILL ROD RACK



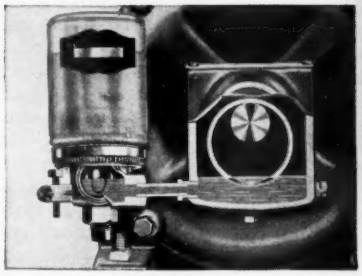
Eliminate trouble and waste effort with this modern method of storing drill rod. Put the Acro rack in a central location of each department and make it simple for each mechanic to select correct rod size in a hurry. It also provides a visual inventory for checking rod replacements.
Accommodates 26 letter sizes, 52 pieces; 47 fractional sizes, 138 pieces; 60 number sizes, 304 pieces. Fractional sizes graduated in 64ths from 1/32" to ½" and in 32nds from ½" to 1" included.

LEADER PIN OILERS



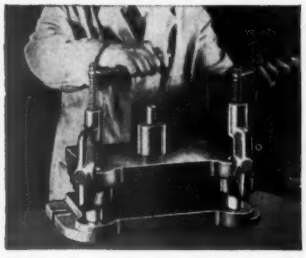
Eliminate wear on your die sets with these leader pin oilers. Acro Pin Oilers, as illustrated, fit over each leader pin and seals in place with a rubber neoprene washer. Each cup is filled with oil so each downward stroke brings bushing in contact with oil and each upward stroke distributes oil evenly over leader pins. Eliminate bushing wear, leader pin scoring, and maintains die accuracy. Die sets equipped with Acro Pin Oilers have run under tests for several weeks to a month without refilling.

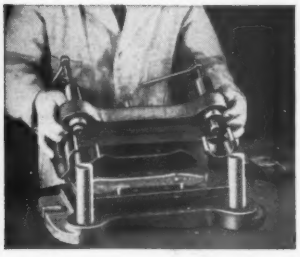
AUTOMATIC LUBRICATORS



With this Acro lubricator, you can lubricate oil ring, capillary, ball or roller bearings on electric motors, blowers, lineshafts and similar bearings for periods as long as six months to one year with one filling. You can save 50 to 95 per cent in oil consumption, practically eliminate maintenance labor and burned out bearings due to faulty hand oiling and guesswork. In addition to savings effected in labor and maintenance, Acro lubricators soon pay for themselves in oil savings alone.

DIE SET PULLERS





The principle of the Acro Die Set Puller is to remove the punch holder from the die shoe by a straight upward pull, whereby punch holder travels upward from die shoe axially, leaving both leader pins simultaneously. This is accomplished only by use of the indexed screw wrenches which act as indicators, controlling the upward travel. This is an exclusive patented Acro feature, found only in Acro Die Set Pullers.

Free Data

covering each of these profitable accessories is included in our folder. Write for bulletin TP-52.

ACRO

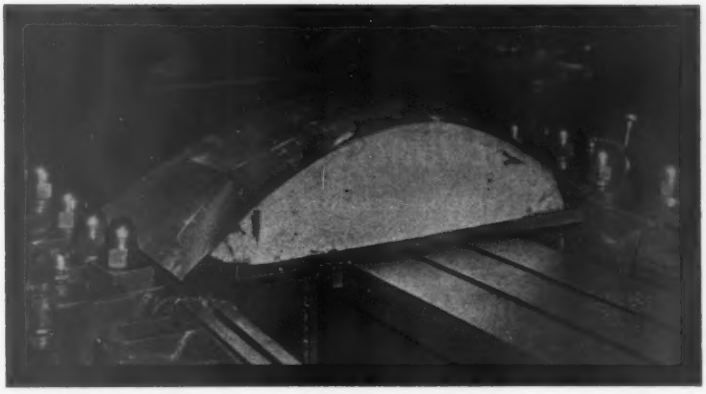
METAL STAMPING CO.

330 EAST RESERVOIR AVE.

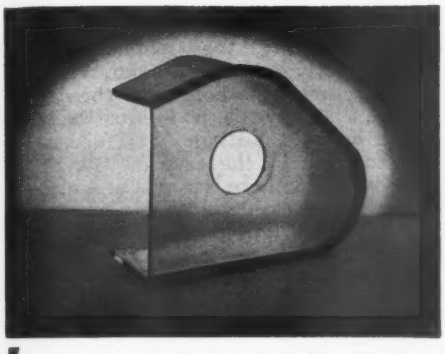
MILWAUKEE 12, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 16

Mold used for contact lamination of fiber glass impregnated with polyester resin. Resin #77 is resistant to heat, will not crack or distort.



Cast stretch-die used in forming aluminum aircraft parts. The high compressive strength of Marblette's resin #71 makes it particularly adaptable to this operation.



Transparent gear housing cast from Marblette phenolic resin #88 demonstrates the excellent light transmitting properties of the Marblette compound.

The stylus of the pantograph is moved over the contours of the pattern, made of Marblette resin #71, reproducing it with complete accuracy in the multiple cavity steel die in the background.

This picture page shows Marblette's Phenolic Casting Resins at work for Tool and Die Men and Foundry Men who believe sound economics make the best foundation for lasting profits.

At Marblette you'll find one of America's most versatile groups of specialists in phenolic resins. And around these men, in the last 25 years, Marblette has built up the special equipment specialists must have in order to provide you with the special liquid phenolic resin necessary to meet your specific production requirements. The Marblette Corporation, Long Island City 1, N. Y.

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25th ANNIVERSARY the marblette corporation

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liquid phenolic resins Casting resins for dies and tools · Heat and acid resistant resins · Bonding resins · Metal coating
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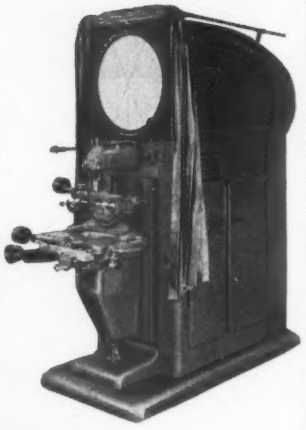
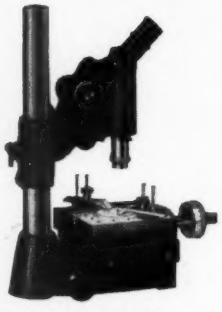
in measurement, assembly, inspection . . .

CONTOUR MEASURING PROJECTOR

Save time, money, and materials by spotting inaccuracies quickly and simply . . . with highest-precision measurements. You get angular measurements to ± 1 minute of arc with a protractor screen, and direct linear measurements to ± .0001" over a range of 4" by 6" with the cross slide stage. Dimensions, angles and profiles of production-run parts can be compared directly with a *traced* outline of the projected image of the master part, or with a scale drawing superimposed on the screen. Write for Catalog D-27.

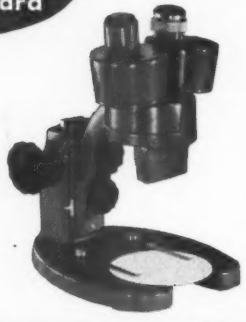


. . . industry's *UNEQUALLED* standard



TOOLMAKERS' MICROSCOPE

This sturdy microscope gives you one inch linear measurements to ± .0001" and angular measurements (with protractor eyepiece) to ± 1 minute of arc. Operation is extremely *simple* and *fast*. Opaque and transparent objects of any contour can be measured. Write for Catalog D-22.



STEREOMICROSCOPES

The finest optical system ever produced for stereoscopic work assures you precision accuracy in small parts assembly operations and in inspection of tools and finished parts. You get clear, sharp, three-dimensional images, and a *wider area of focus than ever before*. The magnified image is erect and *unreversed*, for easier interpretation by the average user. These sturdy, dustproof microscopes are extensively used in industry, either alone or incorporated into machine tools. Write for Catalog D-15.

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Bausch & Lomb *Quality Control* Instruments

CIRCLE INFORM-A-GRAM KEY NO. 18

. . . Month's Talk, from page 15

be turned 90° to enter the double belt elevator properly. A little spring-loaded finger is mounted to turn the can and let it roll down a guided chute (adjustable to the size can being made) to the feed-in end of the elevator, which raises it to the ceiling, and feeds it into a cascade gravity conveyor feeding the flanger. The flanger puts a flange on each end of the can.

The can then rolls from the flanger to another double belt elevator which again elevates it to the ceiling and feeds it into another cascade gravity conveyor feeding the seamer. To properly enter the seamer, which assembles the bottom of the can to the body, the body must be in a vertical position; therefore, at the end of the cascade gravity conveyor there is a twister which automatically positions the cans in an upright position.

The seamer automatically feeds in a bottom for each body. As the can is ejected out of the seamer in a vertical position, it is twisted over on the side so it will roll down the guided chute to a single belt elevator, which again elevates it to the ceiling and feeds it into another cascade gravity conveyor feeding another seamer to put the top on the can. To feed into this second seamer, the can must be upside-down, so again we have a twister which automatically positions the can and the seamer feeds in the top for each body. The can is then ejected in a vertical position and is twisted in the proper direction, so it will roll down the chute to another single belt elevator which again raises it to the ceiling, and another cascade gravity conveyor. From here it is fed into the air test machine.

The cans roll into the air tester with the open sides all in one direction. The air tester automatically ejects any cans showing leaks, just prior to where the good cans are ejected. From here they sometimes are elevated again to the ceiling and cascade down to the packers' tables, where they are put in crates, cartons or, in some cases, heavy kraft paper bags for shipment. However, in some canning plants that make their own cans, the cans are conveyed directly to the sterilizer when necessary, then to the filling machines, and to the sealers, through the cooking process, and cooling, when re-

. . . Continued on page 22

at a lower piece cost with SPIRAL special cutting tools

HIGH SPEED OR CARBIDE

Tough cutting problems are simplified with Spiral special tools. The solution illustrated here is another example of how Spiral provides maximum tolerance control and longer tool life, while increasing production, with special tools fitted to the job.

FREE TOOL ENGINEERING HELP

For a quick answer to your specific cutting tool problems, send complete details, including tool, part print and specifications. Write for a free copy of latest bulletin showing other examples of SPIRAL time saving tools.

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Working from your tool or part prints, SPIRAL will design and build single or multiple insert circular or dovetail form tools for any of your carbide form tool requirements.

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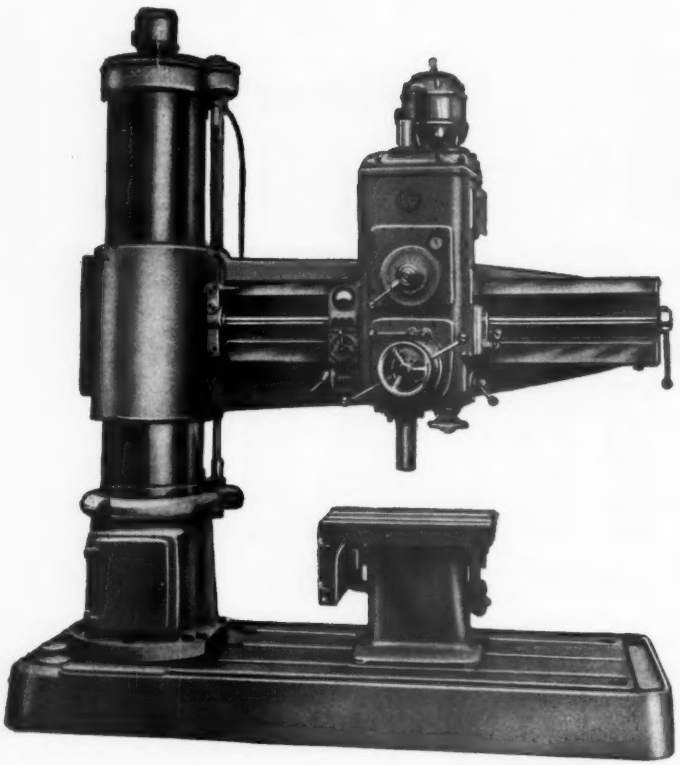
CIRCLE INFORM-A-GRAM KEY NO. 19

KOLB RADIAL DRILLS FOR LIGHT·MEDIUM·HEAVY DUTY



For greater efficiency, 36 speeds and 12 feeds can be pre-selected on this HKH Kolb Radial equipped with electro-hydraulic pre-selectors.

FOR ACCURATE PRODUCTION

- Heavy bases, columns and arms —Rigidly constructed
- Column diameters from 7½" to 35"
- Flanged motor mounted on top of spindle head
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- Hardened and ground spline shafts rotating on ball bearings

FOR SPEEDIER PRODUCTION

- Selector device for pre-setting speeds and feeds
- Rigid locking of column and spindle head by electro-hydraulic clamping system (automatically or by hand)
- Push button controls
- Automatic depth release

FOR YOUR PRODUCTION

- Maximum drilling capacities Cast Iron—8" dia. Steel—6" dia.
- Maximum drill radii—27" to 180"
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- Feeds—6, 9, 12 or 18—from .0012" to .1181" per rev.

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LET COSA QUOTE ON YOUR SPECIFIC NEEDS

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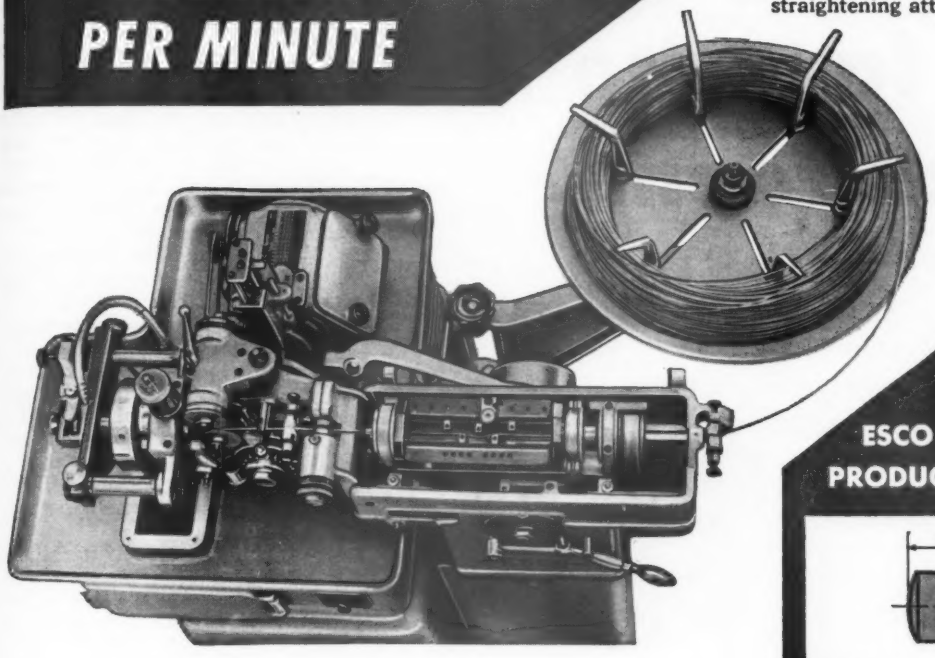
Your source for all Precision Machine Tools—from Small Bench Lathes to Large Boring Mills

CIRCLE INFORM-A-GRAM KEY NO. 20

GET UP TO 100 SMALL PRECISION PIECES PER MINUTE

Below: ESCO ROTOMATIC DS 1 with optional wire-straightening attachment

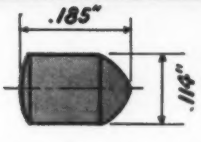


PARTS UP TO 5/32" DIA. X 1" LONG MACHINED AS CLOSE AS ± .00025" FROM COILS OR BARS

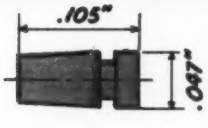
A Swiss automatic form-turning and cut-off machine with optional wire-straightening attachment—you get high-speed production from coils or bars of any length. Coil-feeding speeds and economizes your operation by eliminating bar ends and bar loading time. Machining is done by two cutting tools mounted in a cam controlled tool head. The tool head rotates around material which is fed, guided, and clamped by a collet and a guide bushing. Machined parts are smooth, straight and *entirely burr-free* when they are delivered to the tray *separate from the chips.*

Get more information today about this machine and see how it can boost your production and cut your costs.

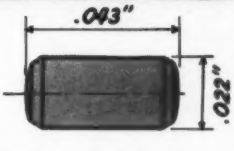
TYPICAL ESCO ROTOMATIC PRODUCTION RATES



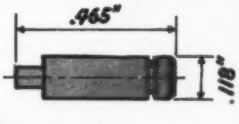
100/min.—brass



63/min.—nickel-silver



50/min.—nickel



10/min.—mild steel

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This magnifier is a favorite in toolrooms

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Write today for tell-all handbook and catalog, "INDUSTRIAL MAGNIFIERS, HOW TO CHOOSE AND USE THEM"

B&L BAUSCH & LOMB
Industrial Magnifiers

. . . Month's Talk, from page 18

quired, then to the warehouse where they may be labeled, cartoned, sealed, and palletized, ready for shipment.

In some installations overhead cable conveyors take the cans from the belt elevators and convey them to the chute or cascade which feeds the cans into the various can making machines.

The cascade and cable conveyors, between the belt elevator and the machine it is feeding, act as a bank or reserve to permit a machine to operate, should the machine from which the can came be stopped momentarily.

Various machines in a can line may be stopped momentarily, as in the case of the bodymaker, if the operator does not keep a supply of tin plate in the feeder box.

The entire line is automatically electrically controlled to stop any individual machine or the entire line, if cans or parts are not available. The flanger, the seamers, and air testers will not operate if there are no cans, tops or bottoms.

The palletizing machine is also another form of automation with which I am sure we are all acquainted. This machine performs the operation of receiving packages or parcels of individual items from a conveyor, twisting and turning them, and stacks them on the pallet in an interlocking pattern.

This machine has a magazine where empty pallets are placed and automatically fed to receive the items being palletized when one full pallet is ejected from the machine.

This type of machine is a specially designed unit, and must be designed to handle a particular range of package sizes and shapes.

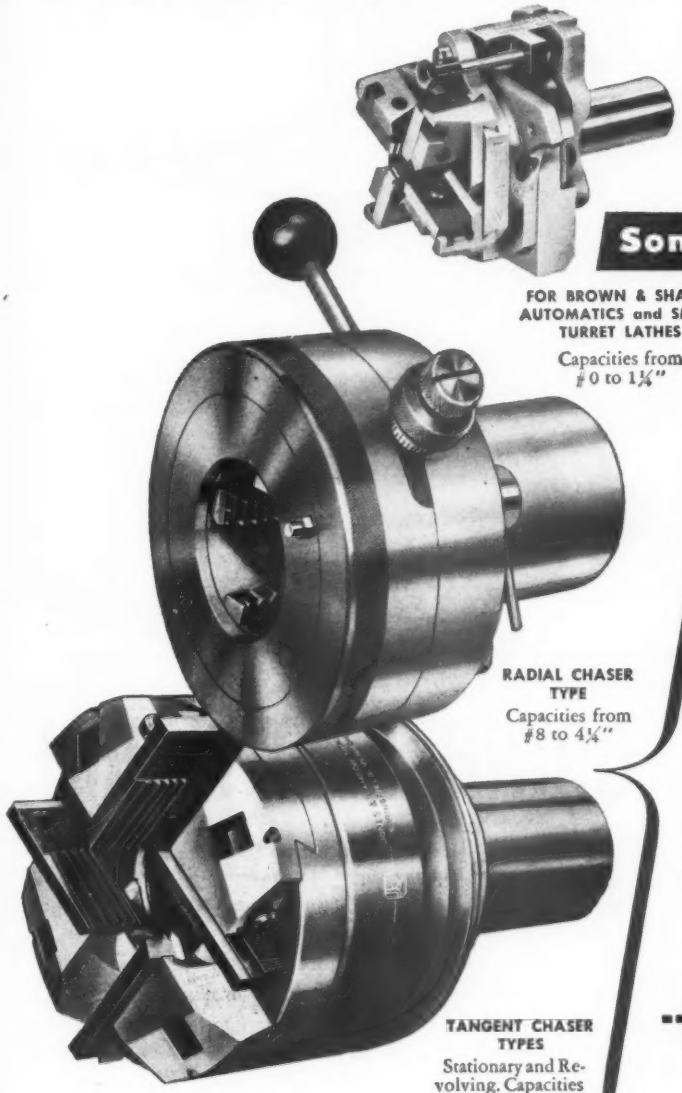
The transferring of parts automatically from one conveyor system to another or from one means of material handling to another has been successfully accomplished in many plants. An overhead cable conveyor will pick up a trolley with a carrier suspended from it that operates on a free rail system or a monorail system during process. The carrier is empty when it reaches the end of the monorail system. It is automatically picked up by the cable conveyor and conveyed a considerable distance overhead, then brought down and deposited at the beginning of the monorail system.

. . . Continued on page 30

CIRCLE INFORM-A-GRAM KEY NO. 22

JONES & LAMSON GUARANTEES CLASS III THREADS with REPETITIVE ACCURACY!

J & L Automatic Opening Die Heads are sold with this guarantee: that your threads will be held consistently within the exacting Class III tolerances for form, lead and pitch diameter, throughout the long life of the J & L chasers.



FOR BROWN & SHARPE AUTOMATICS and SMALL TURRET LATHES
Capacities from #0 to 1¼"

RADIAL CHASER TYPE
Capacities from #8 to 4¼"

TANGENT CHASER TYPES
Stationary and Revolving. Capacities from #4 to 2"

Some of the reasons why:

COMPACT, RUGGED DESIGN GIVES MAXIMUM SUPPORT TO THE CHASERS. J & L Dies are made of solid steel, no built-up sections, hardened and precision ground throughout. Chasers are supported at the point of, and in the direction of, maximum strain.

THREAD FORM, HELIX, PRECISION POINT HEIGHT, ARE ALL GROUND INTO CHASERS AFTER HARDENING. This gives you a freer cutting tool, operating with minimum wear and repetitive Class III accuracy. The high precision of the J & L chasers is maintained in the Die by exclusive chaser holding features.

EASY, CONTROLLED RESHARPENING. J & L chasers are resharpened independently of the holders or dies. Instructions are simple, easy to follow. Eliminates guesswork. Exclusive holding features assure accurate resetting.

P.S. *Only J & L Die Heads and Chasers give you ALL these features. Write to Dept. 710 for illustrated catalogs and complete information.*

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 519 Clinton St., Dept. 710, Springfield, Vt., U.S.A. J&L DIE HEAD DIVISION

CIRCLE INFORM-A-GRAM KEY NO. 23

ABRASIVE No. 3B
POWER FEED
SURFACE GRINDER

the carefully built grinder

CAREFUL . . . GRINDER AT WORK!

Good machines are the surest step toward quality output . . . and there's no machine tool that's more careful with your work than the ABRASIVE 3B Surface Grinder.

Thousands of Abrasive 3B Surface Grinders are in use in automotive, airplane engine, and tool plants throughout this country and abroad. Find out for yourself how this fast, accurate surface grinder—with its power table traverse and cross feeds—can help in your plant. Write for descriptive catalog. Abrasive Machine Tool Company, 16 Dunellen Road, East Providence 14, R. I.

ABRASIVE
ACCURACY BOOSTS PRODUCTION

Abrasive Quality Is Reflected in the Finish of Your Product

CIRCLE INFORM-A-GRAM KEY NO. 24

Tracer-Controlled Pantograph cuts and rounds thermal slot in 8-foot steel propeller blade in 40 minutes; previous time was 5 hours, 10 minutes — just one of hundreds of examples of time and cost saving with tracer-controlled Pantograph machines.

Pantography IS NEW —

By George Gorton III
Executive Vice President,
George Gorton Machine Co.

— in the sense that industry at large and Metal Working people in particular are just beginning to appreciate the many advantages Pantography offers to those faced with the Design-Production problems of today and tomorrow.

INDUSTRY'S foremost responsibility right now is to produce faster, to highest quality standards and at lower cost — whether on defense contracts or for our civilian needs.

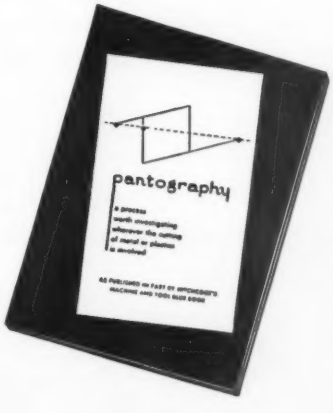
Today, there are literally thousands of operations being performed throughout industry which can be speeded up, improved in quality and lowered in cost by the use of available models of special machine tools. The modern tracer-controlled Pantograph machine is such a tool. It is both a special purpose machine, ideal for short runs, and it is an accurate single purpose machine which turns out identical parts or pieces to meet tight production schedules.

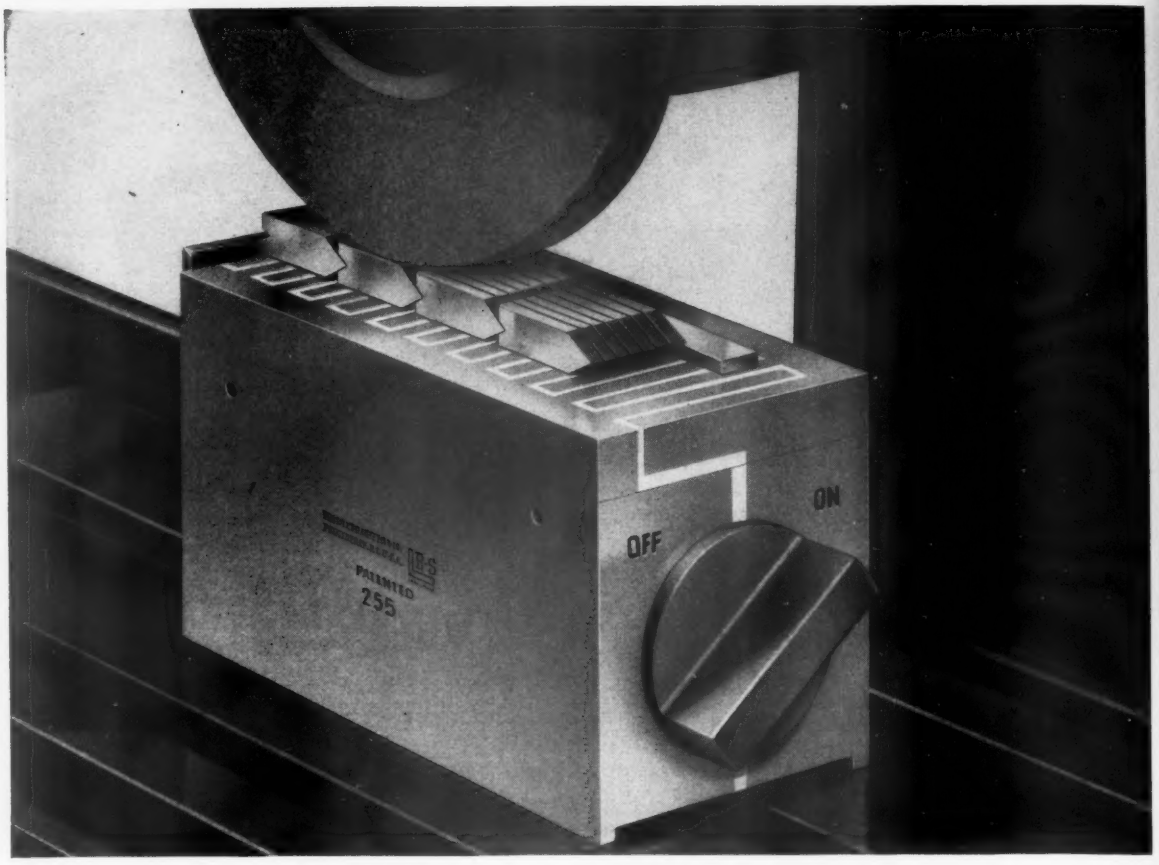
The tracer-controlled Pantograph machine is used for inside and outside profiling, routing, die sinking, mold cutting, counterboring, contour milling, chamfering, grooving, graduating and engraving in ferrous and non-ferrous metals, as well as in plastics.

This machine performs on flat, uniformly curved, cylindrical, spherical or irregular shapes — it works in either 2 or 3 dimensions, in all directions on a horizontal plane, and vertically. It employs enlarged masters, templates or patterns which are quickly and easily made and operates normally at a reduction ratio thereby increasing accuracy — exclusively characteristic of the pantograph.

Single or repetitive accuracy — from one piece to thousands — manual or full automatic operation depending upon quantities — work sizes from the size of a dime to as large as 10 feet.

A new booklet, "Pantography," explains the process and shows what this type of machine can do for you. It is yours without obligation. Write for it today. If interested, also ask for our latest General Catalog 1655. Address the George Gorton Machine Co., 1211 Racine Street, Racine, Wisconsin, U. S. A.





Dependable holding for a variety of uses

Permanent Magnet Chucks . . . Rectangular and Rotary

A POWERFUL MAGNETIC GRIP holds work securely on Brown & Sharpe Permanent Magnet Chucks. No electric current is used . . . no danger of short-circuited wires or heating. Turn of control handle engages or releases magnetic holding power. Completely self-contained and portable for use throughout the shop.

Rectangular Models in 8 sizes from 2 7/16" x 5 1/4" to 12 1/8" x 36"; Rotary Models in 5", 7" and 9" diameters.

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CIRCLE INFORM-A-GRAM KEY NO. 26

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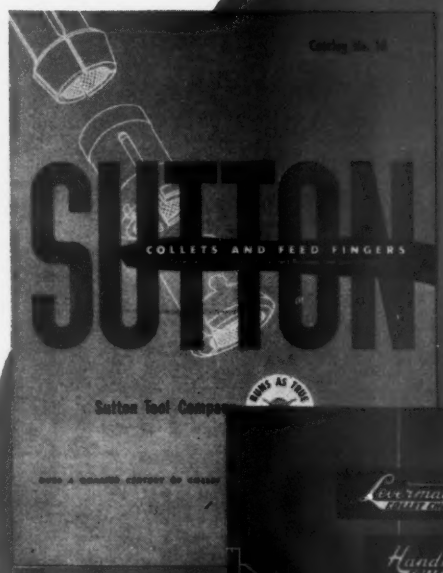
A Library of Collet and Chuck information



34 PAGE AUTHORITATIVE SOURCE FOR COLLET and CHUCK NEEDS

Every size and type collet and feeder is illustrated and described in Sutton's new comprehensive catalog. Designed to provide a quick and easy reference, it lists the correct collet, feeder and pad for automatics, hand machines, turret lathes, milling machines, production and engine lathes. Collets stocked for immediate shipment are keyed for easy identification.

Reasons why the Levermatic Spindle Nose Collet Chuck offers a new standard for positive gripping are explained in the new chuck catalog. Used on all machine tools, this popular chuck grips and releases *instantly* while machine is in constant operation, assuring continuous accuracy and uninterrupted production.

Get your copies today!

Sutton's 26 page Collet Catalog and 8 page Levermatic Chuck Catalog are a must for your file. If more than one copy of each is required, write on your company letterhead.

Sutton Tool Company, Dept. TP11, Sturgis, Mich.
Send free copies of Collet and Chuck Catalogs.

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RUNS AS TRUE AS THE SPINDLE

Sutton Tool Company

Over a Quarter of a Century of Collet Service.

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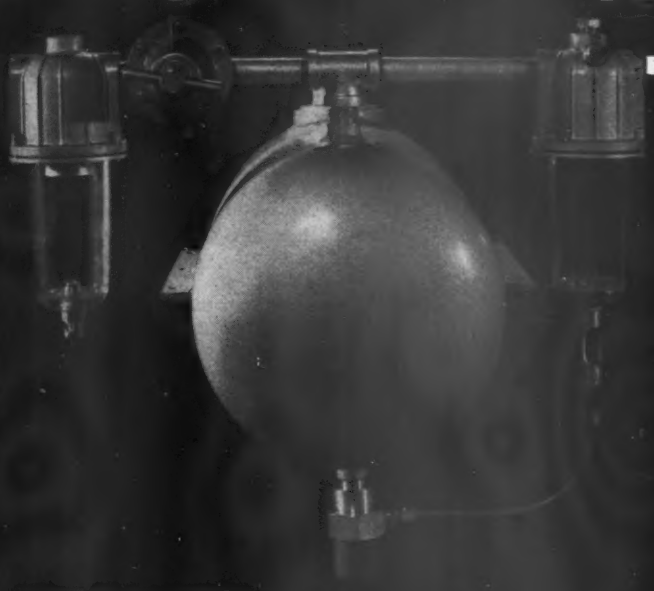
CIRCLE INFORM-A-GRAM KEY NO. 28

IT'S NEW... lo-jet acro*



the revolutionary new coolant system that . . .

keeps cutting tool and work at room temperatures!

lo-jet acro's *proven results in America's leading industries are making production history, from coast to coast!*

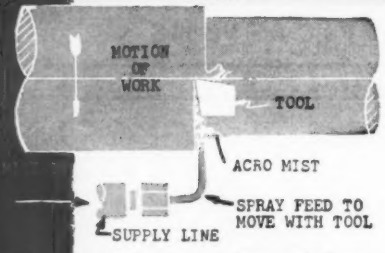
* Controlled compressed air operation for all types of metal cutting with special ACRO-COOLANT soluble solution.

Pictured here is the 8 1/8" outlet centrifugal equalizer distributor with 8 copper tube spray feed. This assembly serves 8 cutting operations.

lo-jet acro

- prolongs tool life
- cuts tool breakage loss
- saves money
- speeds production
- keeps work clean

there is a lo-jet acro *system for every purpose and every machine.*



write now for more information at no obligation.

Our engineering staff will cooperate free of charge.

lo-jet acro *is a product of*

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CIRCLE INFORM-A-GRAM KEY NO. 29

...the SPOTLIGHT is on the PRESS-RITE

60 TON POWER PRESS

featuring...

- Press-Rite Airflex Clutch and Brake System
- One-Piece Heavy Duty Frame with Built-In Tie Rods
- Triple Ramway Lubrication
- Non-Repeat Single Stroke Mechanism
- Roller Bearing Flywheel

The No. 60 is one of a complete line of Press-Rite Presses from 5 to 85 tons capacity. Write for catalog with specifications of all models.

NOW . . . a 60-ton power press with all the famous Press-Rite features! Available in either flywheel or back-geared models, the Press-Rite No. 60 is designed with extra frame and built-in tie rods to provide rigidity that practically eliminates deflection on heavy drawing and blanking operations. The large die space simplifies handling of bulky dies . . . cuts set up time. The Press-Rite Airflex Clutch and Brake System delivers full stroke power through every operating cycle . . . provides positive, instantaneous braking action. High production . . . low maintenance . . . long dependable operation — these advantages make the Press-Rite No. 60 a profitable addition to your production line.

SPECIFICATIONS

Number of Press	60
Diameter of Crankshaft Bearing	4¼"
Standard Stroke	4"
Maximum Stroke	7"
Distance Bed to Slide	14"
Bolster Area, F.B. x R.L.	21" x 32"
Distance Back from Center line of slide	11"
Opening in Bed	13" x 16½"
Diameter of Hole in Slide	1½" to 2½"
Flywheel Speed R.P.M.	*80 to 100
Floor Space Legs, F.B. x R.L.	52" x 50"
Motor R.P.M.	900

*Air Clutch recommended for speeds greater than 80 R.P.M.

Sales Service Machine Tool Co. SSMT

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CIRCLE INFORM-A-GRAM KEY NO. 30

. . . Month's Talk, from page 22

It is not too difficult an operation to pick up carriers, either loaded or empty, or parts from one conveyor and automatically position them to be picked up by another conveyor and taken through another portion of the manufacturing process. Automatic transfer can be accomplished between different types of conveyors.

Many sorting operations have been performed with a variety of material handling equipment. We recall an installation handling left and righthand bumper brackets where the operator received six types from an oil quench operation. He placed each bracket on a particular colored tray, and this tray automatically discharged the bracket at a predetermined location, tilting the tray as it passed through a tripping station. These trays were arranged so they would only tilt at a particular station, and bypass the other tripping stations which trip the other trays, delivering each type bracket to a different location.

It is possible to automatically keep a small bank of pieces at a number of machines performing the same operation, and replenish them as they are consumed.

When one piece is placed in the machine manually or automatically, the balance of the bank moves forward, and this permits a signal device to energize a mechanism in the main conveyor, to deflect the next piece into the magazine. When the magazine is full, the deflecting mechanism retracts and permits the following pieces to go on to the next machines, etc. If the last machine in the line cannot receive the part, it will automatically be returned to the beginning of the system and make another trip until consumed.

As parts are discharged from the group of machines onto one conveyor, to be delivered to another group, performing the second operation, a traffic problem is involved. Signal devices can control the entry of the parts onto the conveyor automatically without stopping the machines.

Many operations of automatic handling, transferring, etc., have been developed because it is impossible for a human being to perform these operations.

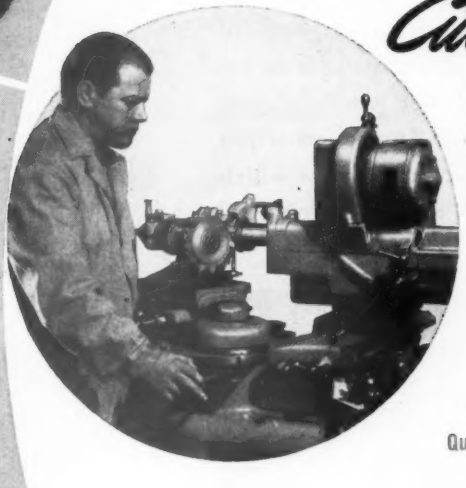
Recently we were called in to help develop a system to automatically heat treat, quench,

. . . Continued on page 35

GIVE YOUR CUTTING TOOLS THE EDGE

WITH A

PRATT & WHITNEY *Cutter and Radius* GRINDER



RADII, ANGLES or TANGENTS . . . STRAIGHT or TAPERED FLUTES . . . SQUARE, RADIUS or BALL ENDS — Grind Them Quickly, Economically, Accurately

Today's high speed machines require sharp, accurately ground cutting tools for efficient production. A Pratt & Whitney Cutter and Radius Grinder will give you longer tool life, faster stock removal and lower tooling costs.

Practically every type of cutting tool — stock or special — can be ground quickly and economically. Difficult jobs like grinding accurate ball and radius noses on end mills are handled with speed and ease. To assure flute uniformity and concentricity, all tools are ground from the shank — and not from centers.

The P&W Cutter and Radius Grinder is expertly designed for ease of operation and is ruggedly constructed of the finest materials for a long, accurate life under hard, constant use. Two sizes grind flute lengths up to 4½" and 10" respectively. Mail coupon for complete information.

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Precision Production Machines for Aircraft Manufacturers

THERE is a widespread general acceptance of these machines as being capable of meeting the extreme accuracy requirements of the aircraft industry. They combine high speed, accuracy, ease of operation, and low initial cost. This means tool room accuracy, better part finish and low cost production. These fast-action machines are cutting costs on jobs which were usually allotted to large, slow and expensive machines.

HARDINGE Model HC
Chucking Machine
Collet capacity 1", Chucking capacity 6", Swing 13"

HARDINGE Model DSM 59
Second Operation Machine
Collet capacity 1", Chuck capacity 6"

The Hardinge Second Operation Machine is a time-tried production machine, easy to set up and relatively inexperienced operators can turn out parts rapidly to close tolerances and fine finish.

The extreme accuracy and high speed of this machine enable you to chuck partially finished parts and to rapidly do close tolerance turning, forming, boring, drilling,threading and facing.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

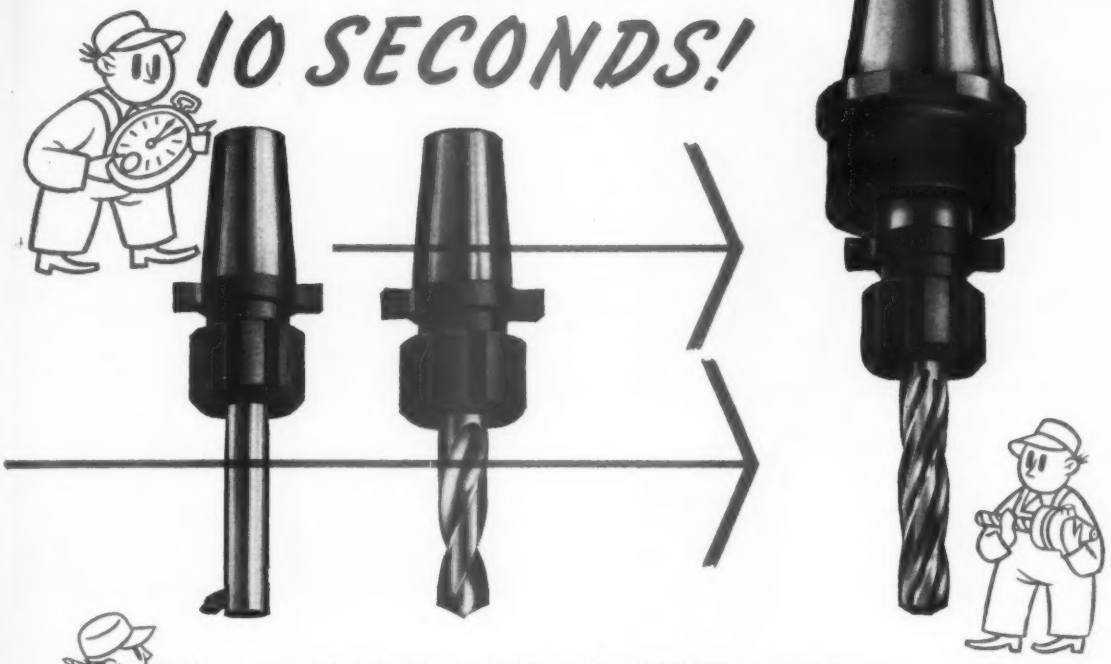
HARDINGE Model HCT
Chucking Machine with Production Threading Head
Collet capacity 1", Chucking capacity 6", Swing 10", Internal and External Threading up to 6"

Hardinge Precision Chucking Machines can finish diameters, shoulders, end faces and cut precision threads in *one setting—all concentric* with each other.

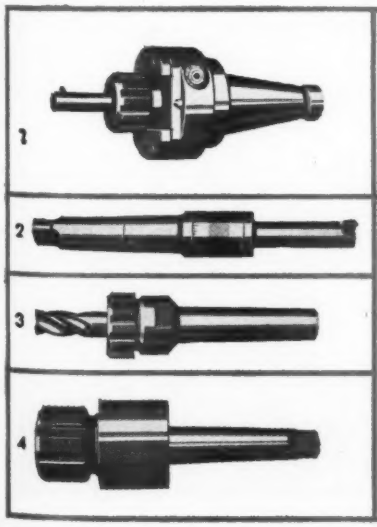
Everyone responsible for the machining of precision parts appreciates the value of machines which can be quickly and inexpensively tooled. These Hardinge machines can be tooled with standard tool bits for fast production of precision parts.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

UNIVERSAL "KWIK-SWITCH" TOOL HOLDER PERMITS TOOL CHANGES IN *10 SECONDS!*



Universal "Kwik-Switch" Tool Holders permit rapid tool changes for operations such as drilling, reaming, and boring on mills, radial drills, while maintaining accuracy and rigidity. Each tool is inserted in its Adapter Chuck and set to proper length and tightened. The Adapter Chuck is then easily locked or unlocked by hand in the Master Chuck by less than a quarter turn. Made of hardened and ground steel, and precision manufactured throughout. Available in straight and taper shanks to fit all machine tools. For complete information, write to the office nearest you — Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Ave., Kenosha, Wis. — or our home office. 177



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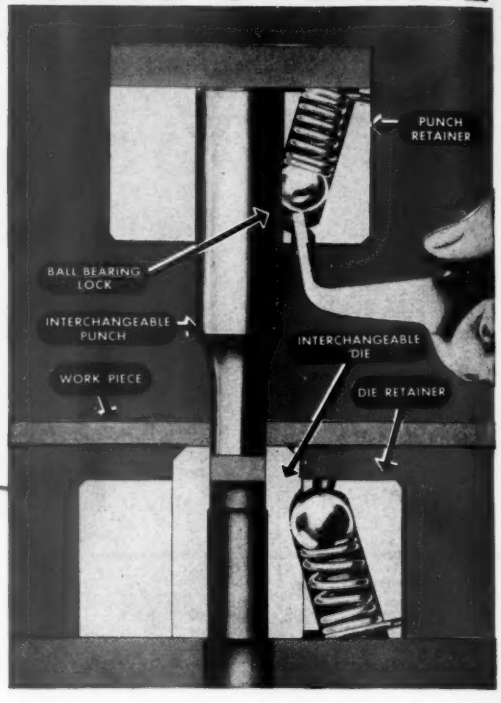
(6) "KWIK-SWITCH" TOOL HOLDER
(7) STANDARD DRILL BUSHING
(8) UNIVERSAL INDEX PLUNGER

CIRCLE INFORM-A-GRAM KEY NO. 33

HOW R-B PUNCHES OPERATE



R-B standardized punches and die buttons are inserted in their retainers with a simple push and a twist.

Punches and die buttons are instantly removed by inserting a tanged tool in retainer hole to release the locking ball.

Each R-B retainer is equipped with a spring-loaded locking ball which engages the recessed portion of standard and special R-B punches and die buttons. Locked punches and die buttons are always accurately aligned—no additional keying is required.

Use R-B Engineering Service for Your Tough Piercing Problems.

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PRECISION GROUND PARTS
SHEET METAL DIES MADE OF FERROUS ALLOYS, ZINC ALLOYS OR PLASTICS

CIRCLE INFORM-A-GRAM KEY NO. 34

. . . Month's Talk, from page 30

draw, and cool high pressure gas cylinders. This was one operation, due to the size of the product, the heat involved, and the precise timing which made it impossible to have men handle these items.

It was finally developed that these units would come to the oven on separate monorail trolleys on a monorail system, and a conveyor pusher system was used to convey these through the oven at a predetermined speed, to let them properly come up to temperature and soak. After emerging from the furnace in groups, they would be quenched by having a hoist unit lower a section of the monorail track to the quench. During the quench, which was timed, they moved forward one station; then the track was raised to the monorail level and, while those just quenched were moved into the draw furnace, another group came out of the heating furnace and a pusher conveyor pushed the quenched cylinders through the draw furnace. After coming out the other end of the draw furnace, they were pushed down along a section of monorail, allowing a time limit for air cooling down to a temperature at which they could continue through further processing and finishing operations.

Another difficult feeding operation, handling large sheets of material in and out of a curing press, was solved by a conveying machine that permitted the operator to prepare one charge, while another was curing, and doubled the production of the curing press.

Prior to use of the feeding conveyor, the operator removed the cured sheets and inserted the raw sheets directly in the press while the press was idle. When the feeding conveyor was installed in front of the press and a similar unit behind the press, the operator removed the finished sheets and inserted raw sheet during the curing time, and double the amount of production resulted.

Now, on reviewing some of the previously mentioned processes that have had some degree of automation, we can indicate what further automation can be added.

For the grain mill, there is very little more that can be added, as our modern day mills

. . . Continued on page 68

in portable grinders

YOUR BEST BUY IS BUCKEYE

When Southern Sanitary Enameling Co., Nashville, needed an additional portable grinder, naturally they specified Buckeye. Why?

Because their first Buckeye grinder, purchased in 1927, is still in use after 25 years grinding gray iron castings without any down-time for major repairs.

In fact, when this "veteran" finally came back for reconditioning, the original cylinder showed no measurable signs of wear. The only parts replaced were three inexpensive rotor blades.

Unusual? Perhaps, but it does indicate that a Buckeye grinder will provide exceptional service, even on the toughest grinding applications. There are 55 grinders listed in our Air Tools Catalog, one of them designed just for your kind of grinding work. Write today for your copy.

Buckeye Tools CORPORATION

DIVISION 19 • DAYTON 1, OHIO

producers of the world's first successful rotary air tools

CIRCLE INFORM-A-GRAM KEY NO. 35

NAVY'S MOST POWERFUL HELICOPTER PERFORMS BEYOND EXPECTATIONS

XHSL-1 *Anti-sub* HELICOPTER *employed* BARTH FACILITIES!

DESIGNED AND BUILT by BELL AIRCRAFT CORP.

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THE BARTH CORPORATION was privileged indeed to have its modern plant facilities selected to assure the extreme precision required in the production of engine parts for this super-helicopter.

Barth's contribution to this important anti-submarine helicopter included work on the ring assembly and the bellcrank. Features of extreme engine compactness in combination with high rotor disc loadings required adherence to extremely close tolerances.

If you have a production, tooling or special machinery requirements, remember, the broad scope and diversity of Barth's designing, engineering and manufacturing facilities are available for consultation without obligation. *Write for catalogue.*

BARTH STAMPING & MACHINE WORKS Inc.
12650 Brookpark Road, Cleveland 29, Ohio

DESIGNERS AND BUILDERS OF DIES, TOOLS AND SPECIAL MACHINERY

CIRCLE INFORM-A-GRAM KEY NO. 36

2 MILNE WAYS TO CUT YOUR TOOL STEEL COSTS

1 MILNE'S
KOLORKOTE IDENTIFICATION
With Matching Heat Treat Card

Permanent, quick-as-a-glance identification of Milne tool steels is a sure thing because they are spray painted an identifying color over their entire length. With every shipment goes a heat treatment card of a color that matches the steel. You eliminate costly errors, delays, confusion and 'phone calls. Inventory control, scrap identification and stock movements are simplified.

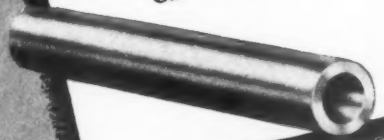
You know *what you get...how to treat it... as long as you have it.*

2 MILNE'S
HOLLOW DIE STEELS

You get more tool per pound when you use Milne hollow steels.

Waste is minimized. Smooth finish inside and out saves hours of machining. Each piece is uniformly annealed *at the mill*. Prompt deliveries from stock. Eliminates waiting for forgings.

Cut to any length desired.



MILNE'S
New Pre-Shaped Steels
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Editorial Index

DEPARTMENTS

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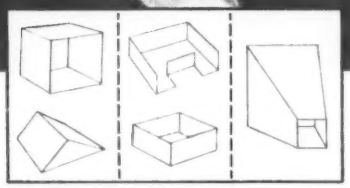
Capsule description of current literature. . Bulletins, brochures, catalogs and circulars - - - You name it

SHOP AIDS 99
Need help in any aspect of modern metalworking? See this section for materials and design aids, inspection and production techniques.



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BOX FINGER BRAKE**

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A number of forming jobs can be done with the Di-Acro Box Finger Brake by simply adjusting or changing the type of mounting bar on the contact surface. Di- Acro Finger Brake is:

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CIRCLE INFORM-A-GRAM KEY NO. 38

— FEATURES —

Editorial 41

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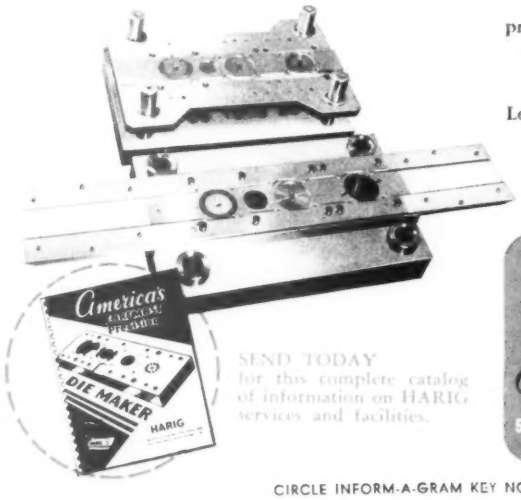

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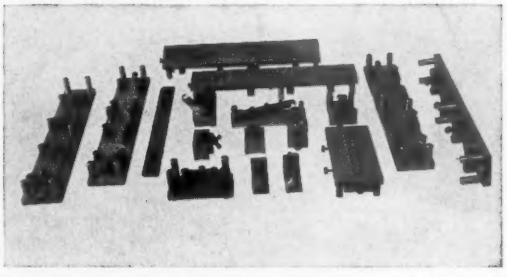
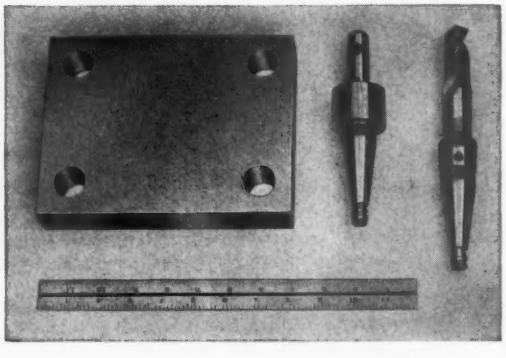


Manufacture of this group of drill jigs involves accurately locating, drilling and boring approximately 400 holes. The No. 1 Moore Jig Borer finished them to "tenths" in from five to seven minutes per hole.

ON PRODUCTION

64 holes to ±.0002"—2 minutes each on the No. 2 Moore Jig Borer



Sixteen pieces like this were located, drilled, bored and checked on a No. 2 Moore Jig Borer with one drill and one carbide bit. The 64 holes were finished in 2 hours and 8 minutes (plus 30 minutes setup) with location and size tolerances ± .0002".

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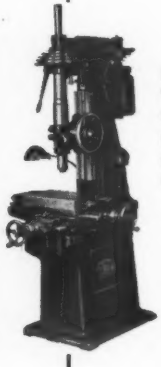

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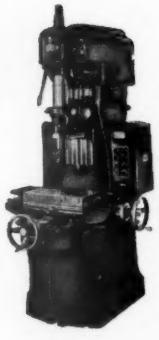

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CIRCLE INFORM-A-GRAM KEY NO. 40

editorial

a 5-star industry film

In 1945 the Jones & Lamson Machine Company embarked on a steel turning research program of considerable magnitude. This was sparked by their conviction, arrived at during the last war, that steel could be turned at much higher speeds than were being used.

The program was both intensive and extensive, running the whole gamut of steel analyses, cutting tool geometry, speeds and feeds, tool temperature and pressure recordings, coolant variations, photomicrographic observations, determinations of horsepower at the tool point, and the floor-to-floor times for repetitive jobs. For conducting the tests J & L built three 16″ Fay lathes and equipped them with the necessary controls and instrumentation.

Early this past summer we saw some dozen jobs running in the Jones & Lamson shops, which were in confirmation of their research findings, i.e., that the combination of rugged, modern machine tools, tooled with carbide, and backed up by plenty of horsepower, can result in spectacular attainments in productivity, quality of surface finish, and tolerance holding.

Fortunately (or unfortunately, if you admire and enjoy the beautiful Vermont countryside as much as we do) it is not necessary to drive to the Jones & Lamson plant in order to view these steel turning accomplishments. J & L has "packaged" the whole story in a sound-and-color film that is one of the finest technical film productions we have ever seen.

The film, entitled "Research in Metal Turning" includes examples of heretofore difficult or "impossible" steel turning, now running as production jobs through application of the latest techniques. The illustrated case histories include steel forgings as well as bar stock. The camera does a wonderful job of disclosing chip formation, surface structure, effects of coolants, chip breaker design, tool grinds, cratering, heat generation, and varying speeds and feeds. It is shown that turning at high speeds often eliminates subsequent finishing operations. Only a couple "episodes" from the film are necessary to give an idea of the value of the know-how and show-how that it offers.

One covers a bolt making job. Material: #1040 hot rolled steel bar stock, heat treated to 30 R/c. It is completely machined at 2000 rpm, including a ¾-10 thread and cut off, in 65 seconds, floor-to-floor. Holding a 14 micro-inch finish, and a body diameter tolerance of plus 0, minus .001″ at this speed together with the production of a class 4 thread (in less than one-half second) is something to see!

Comparison photomicrographs show how increased cutting speeds reduce the damage in the surface structure of the workpiece. In one instance 100fpm disrupted the surface structure to a depth of .006″, whereas bumping the speed up to 600 fpm decreased the damage penetration to only about .001″.

Particularly informative are the shots that show how tool point temperature and location of the hot spot are affected by various cutting speeds and tool grinds. These tests cover cutting speeds of 150 to 1200 fpm, and tool top rake angles of 5 degrees positive through zero to 5 degrees negative. They show most dramatically how important tool geometry is to good tool life.

Much of the educational value of the film comes from those shots taken with a high speed camera (3000 frames per second) mounted on the lathe cross slide so that the camera was in constant focus on the tool point and moved with the tool.

"Research in Metal Turning" is available for showing before engineering society chapters, management and employee groups, technical schools and colleges, upon application to Jones & Lamson's film loan library. It demonstrates that high-velocity metal removal, by increasing operator and machine productivity can also, paradoxically, decrease operator fatigue.

This is because with floor-to-floor time drastically reduced, there becomes a greater disparity between actual machining time and handling time. Hence, in order to enable the operator to match his machine's potential productivity he must be given more highly mechanized workpiece-handling devices, so that his muscular exertion approaches that of simply pushing buttons.

E. Willard Pennington

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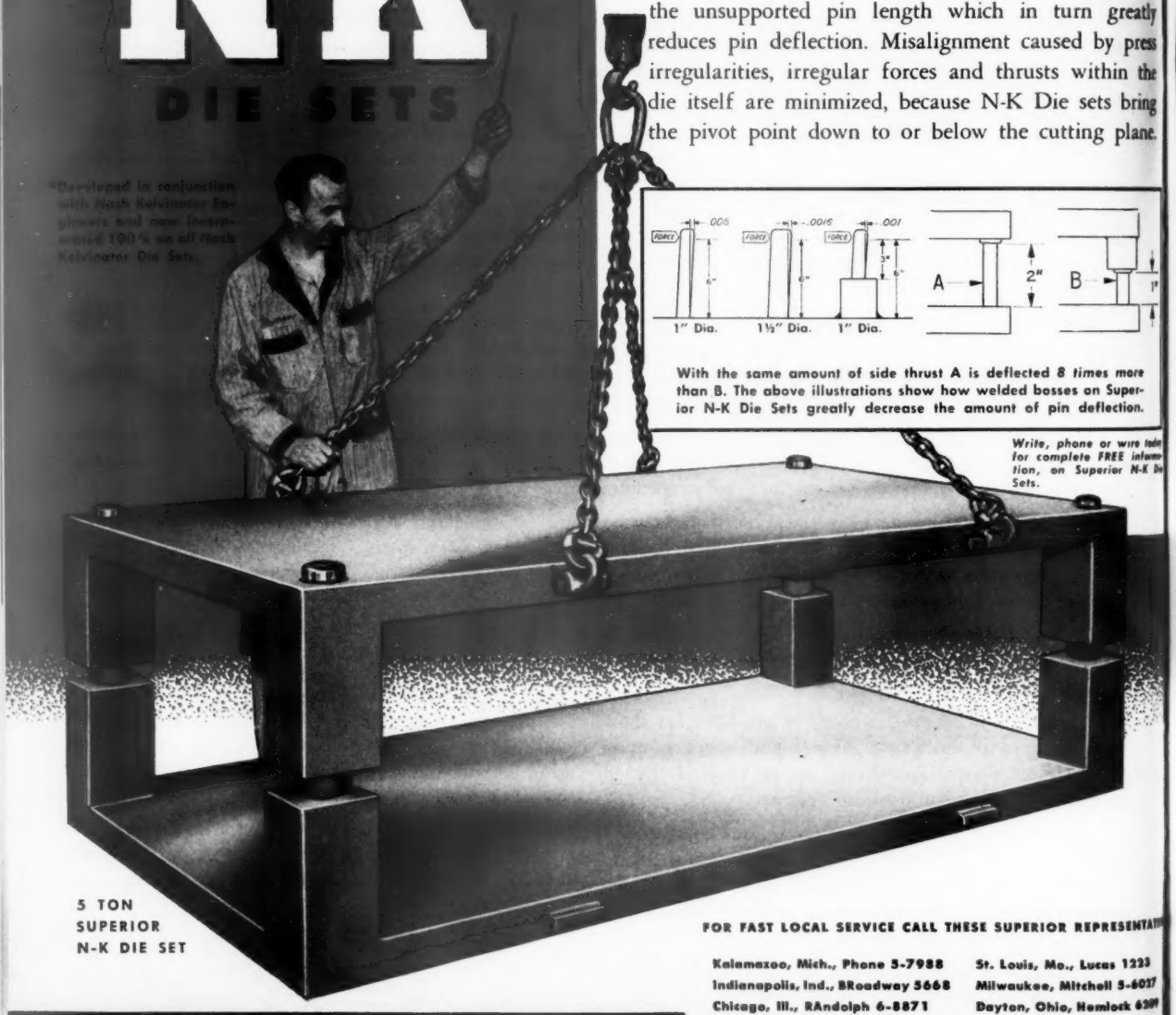

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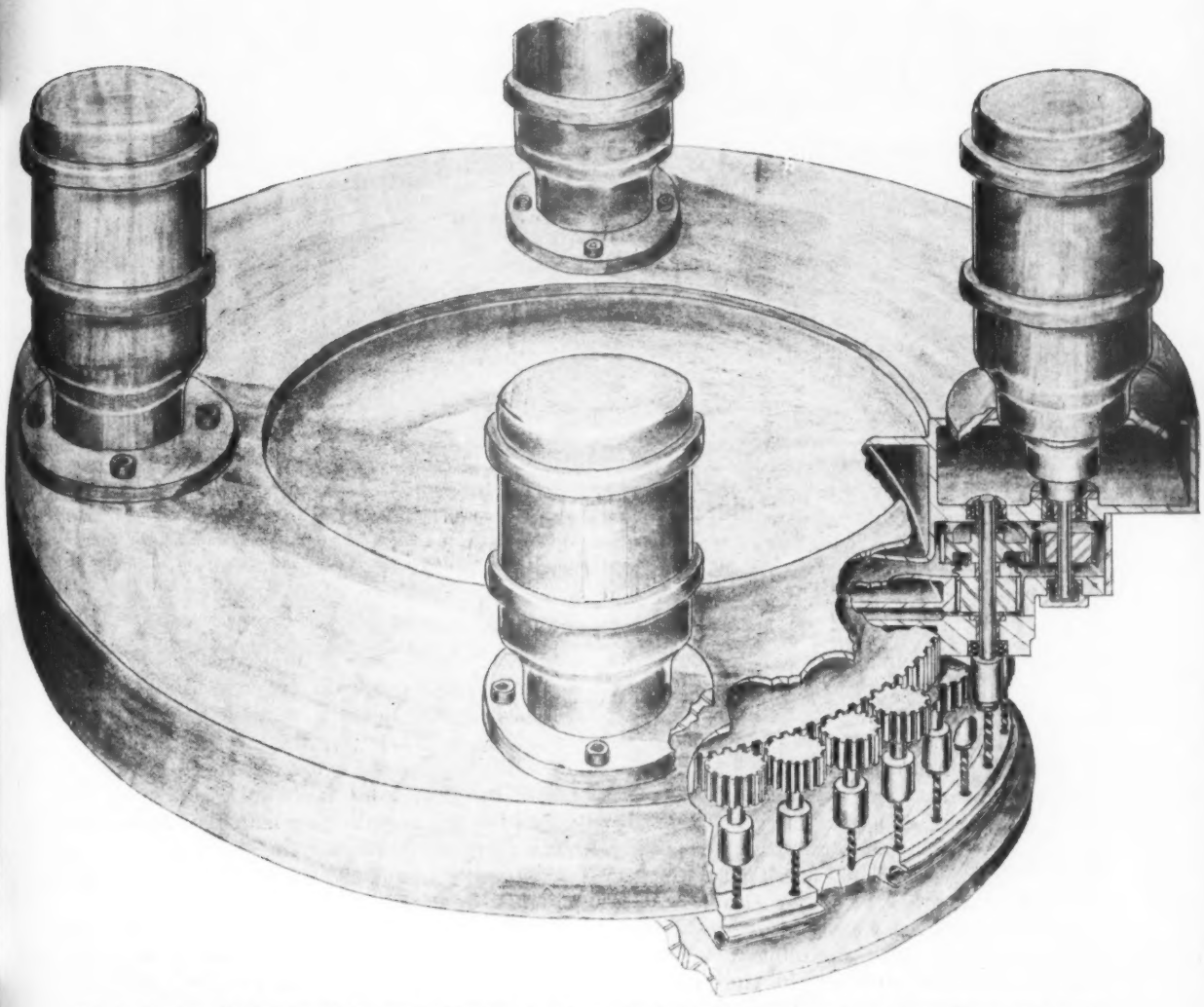


Fig. 4. A schematic drawing of the power drive for the 39-spindle drill head. Each motor is a 25hp, flange-type model.

by MULTIPLE DRILLING EQUIPMENT

WHEN PRODUCTION VOLUME REQUIREMENTS for extremely large parts having many drilled and tapped holes are sufficient, special multiple spindle machine tools are economically feasible. Production levels for heavy vehicles did reach these proportions during World War II and during the recent Korean conflict and holes in many large parts were produced on multiple spindle equipment.

Although the first cost of such machines may be many thousands of dollars they have proven their economic worth in practice to the satisfaction of many metalworking plants.

The usual method of drilling and tapping holes in large parts by using bushing plates and radial drilling equipment is the obvious

by Charles F. Hautau
Chief Engineer
HAUTAU ENGINEERING COMPANY
Detroit, Michigan

Fig. 1. An overall view of the multiple drilling and tapping machine combination from the rear of the machine. The part being drilled at the right is carried forward on the table after drilling, unloaded from the fixture and loaded on a similar fixture in the tapping machine at the left. It is then carried under the tapping head, tapped and carried to the opposite side of the tapping machine where it is unloaded.

solution when volume requirements are low. But when entire batteries of such equipment become necessary, the economic feasibility of special multiple drilling equipment should be investigated by carrying the design of the proposed equipment through a preliminary layout stage in which all details are considered including loading and unloading, locating methods, general machine design and power drive requirements.

Only by carrying a design for special machinery through these preliminary stages can the economic feasibility of the equipment be justified and the plant production department be supplied with a firm quotation.

General Production Engineering Considerations For Special Multiple Drilling Equipment

One of the most important considerations in the selection of multiple drilling equipment for large parts is the method of loading and unloading. Much time saving can be achieved in the production operation if this factor is carefully considered and the best method worked out. Most large parts are cumbersome to handle and the most modern automation concepts should be applied to get the part in the drilling machine with minimum time and effort.

The next important consideration is the general design of the drilling machine. Usually its type (horizontal or vertical) is determined by the loading method so this next problem boils down to the method of feeding the drills into the work. With large parts both the drill head and fixture and part assemblies are heavy, bulky masses of metal and the method of bringing the two together can be the key to the success of the multiple drilling operation.

Once the general design of the machine is established, the power drive should be thoroughly investigated. Horsepower requirements for drilling a multiplicity of holes in large parts can be extremely high. If adequate drives are not provided, the saving in production time can be offset by heavy maintenance requirements.

As far as accuracy is concerned, it is generally accepted that multiple spindle equipment assures extremely accurate location of holes. If the drill bushings are properly maintained, work accuracy is of the highest quality.

Three other important production engineering considerations that should be taken into account in the preliminary design of a multiple drilling machine are coolant requirements, chip clearances, and chip handling. All too often these critical factors are overlooked in

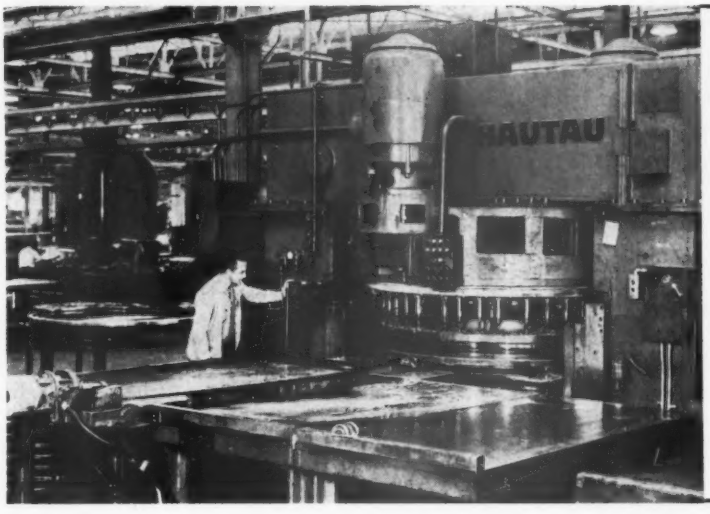


Fig. 2. A view of the drilling operation from the front of the machine. Note the motor drive for the workpiece lifting mechanism at the right.

Fig. 3. A part and fixture assembly being carried forward to unloading position after being tapped in the tapping machine.

machine tool designs, causing an otherwise satisfactory machine to be a dismal failure.

These are particularly important details on large parts as the holes are spaced over large areas and coolant supply must be directed to each spindle. If chip formation and handling details are not adequately worked out, all production time savings can be wiped out while an operator is disentangling chips from packed-up spaces and from around the drill spindles.

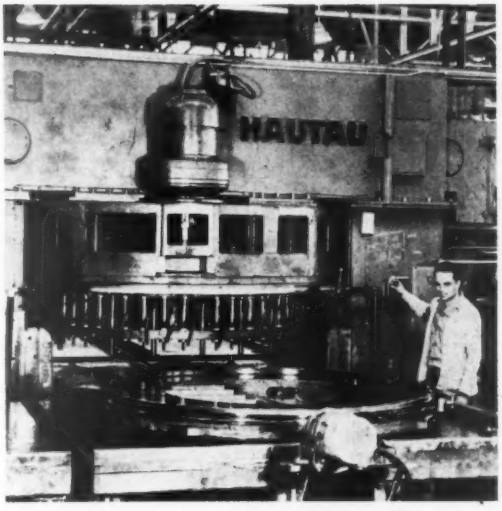
A Typical Multiple Drilling Machine For Large Parts

Military production requirements for tanks during the Korean conflict reached proportions that made the application of multiple drilling and tapping machines to several large components an economic feasibility. One of these was the huge 6-ft. dia. turret ring gear for which one of the most powerful drilling and tapping machine tools ever built was developed. This machine combination, Figure 1, drills thirty-nine 11/16" dia. holes on a bolt circle near the outer periphery of the ring gear and taps them with a ¾-16 thread.

The total horsepower of the drive motors on this huge machine combination is more than 160. Four 25-hp. motors drive the drill spindles and four 15-hp. motors drive the tapping spindles.

Method of Loading

The loading method utilized on this machine is one by which the rings are loaded over a center pilot on a castered fixture. The fixture and part assembly are carried to position under the drilling and tapping spindles by a motor



driven roller chain tension linkage. Ring gears are loaded in the fixture, positioned under the spindles, drilled and the fixture carried through the machine to a table on the opposite side. Then the ring gear is removed from the fixture and loaded on a similar castered fixture in the tapping machine.

In the tapping machine the fixture is positioned under the tapping spindles, tapped, and the fixture carried through the tapping machine to a table on the opposite side where the finished ring gear is unloaded.

General Machine Design

One of the unique features of the machine combination is the method of engaging the drills in the work. The drill head on the first machine remains stationary at all times. When the castered fixture and part assembly is posi-

... Continued on page 170

STANDARD UNITS AND AIR FEEDS SPEED UP DRILLING AND TAPPING

by Carl F. Benner
Assistant Editor

AUTOMATIC OPERATION of machines and equipment, aided by the push button control of thousands of movements, has become the back bone of America's high rate of production in the metal working industry.

In the development of automatic operation of machinery, air circuits, hydraulic circuits and electrical circuits have all played a part. Since the design of these circuits has been made available to industry their application has depended largely on the imagination and ingenuity of men in industry.

The Bellows Company of Akron, Ohio was among the first to recognize the possibilities of "Controlled-Air-Power" with the development of the Bellows Air Motor.

To provide air cylinder operation with full electrical directional control and precise regulation of piston rod speed in both directions, required, in addition to the air cylinder itself, a 4-way directional valve, two power solenoids to operate the valve, and two exhaust throttle valves, plus the necessary piping and electrical conduit.

From this beginning many air operated pieces of equipment have been developed among which are the drill press feeds, air vises, rotary tables, drilling units, jigs and fixtures and work feeders.

A few of the recent applications of Bellows air operated equipment is presented here to show what can be accomplished when a tough problem in production exists.

Drilling and Hollow Milling Costs Reduced 50%

THE SECOND MACHINING OPERATION on the small connector body plug shown in the sketch was costing the S. L. Metal Products Corporation of Brooklyn, N. Y. too much to perform by the method they were using. The

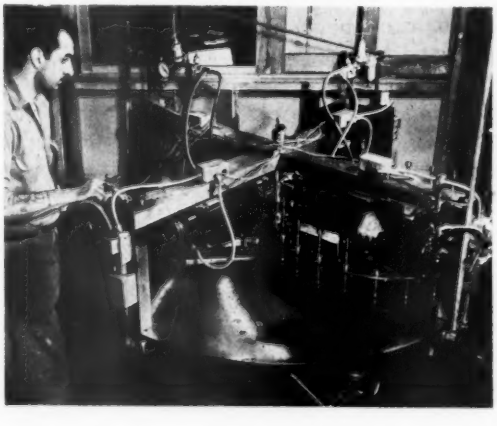
three views to the left in the sketch show the part when ready for the second operation of drilling four 3/32" holes, .025" deep, and two hollow mill operations, .098" in diameter. At the right are two views of the finished machining showing the part revolved 90°.

The job was being done on hand operated drill presses; a time consuming method that kept the costs inordinately high.

The new machine essentially consists of three Bellows air motors, a 24 station rotary feed table, ten Micro switches and four Bellows-Locke drilling units (two for hollow milling and two for drilling) mounted upside down horizontally. With these units electrically interlocked, the operator simply loads and unloads the parts. The machine automatically drills at 90° spacing, four 3/32" holes, .025" deep, in the half brass connector plug cylinders and hollow mills two .098" diameter surfaces at points 180° opposite each other.

The Bellows-Locke drill unit is designed for those operations where it is desirable to have an electrical driven spindle with air powered traverse, hydraulic feed and 110V electrical controls.

It features rapid air-powered approach to the work, controlled hydraulic feed, and rapid return. Developed thrust is directly dependent



on applied air pressure and is approximately three times the applied air pressure. Normal operating pressures range between 80-100 psi. The standard unit has built-in manual start and stop buttons, or it may be operated by a hand or foot switch.

The heart of the operation is an air motor which actuates, in their proper sequence, a succession of intricate machine movements.

A series of Micro switches, 3 pairs connected in parallel as a safety measure, are located along the path of its piston rod at various distances from each other depending upon the timing interval required. As the piston rod advances, tripping these Micro switches, it synchronizes the operation of the entire machine.

Mounted vertically underneath the large table is an air motor for clamping the parts firmly in position while work is being done on them. When this air motor has clamped the part in position, the four Locke Units are advanced—drilling two holes at 180° opposite each other and hollow milling at the alternate positions.

After the Locke units retract, the air motor, seen in the center of the mounting table, rotates the part 90°. The two Locke units, equipped for drilling, are again advanced, thus completing the four drilled holes located at 90° around the cylindrical part.

Operational Sequence

1. Operator loads the parts on the rotary feed table and depresses foot switch (1), as shown in the circuit diagram. This completes the circuit to the timing or sequencing air motor (2) causing its piston rod to advance.

2. One way dog (3) on the piston rod trips Micro switch (4), completing a circuit to the rotary feed table, which indexes bringing the part into position.

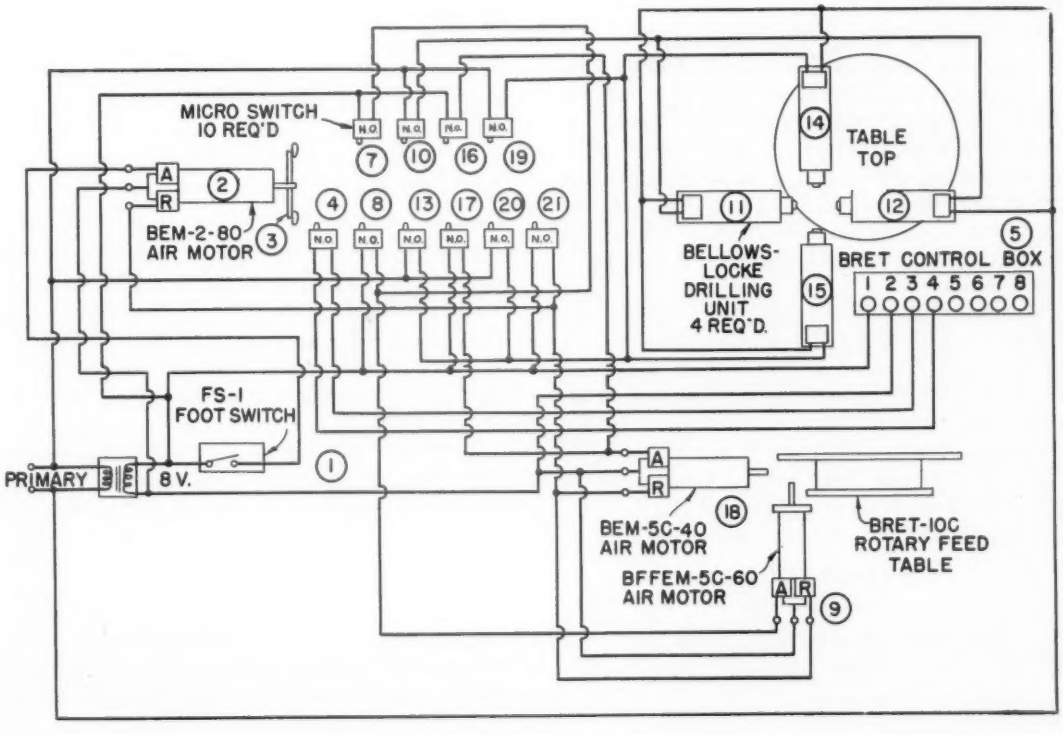
3. The piston rod of the sequencing air motor (2) continues to advance, tripping the second set of Micro switches (7) and (8), mounted in parallel, which send an electrical impulse to the clamping air motor (9), which advances, clamping the part in position.

4. As the piston rod continues to move forward, tripping the third set of Micro switches (10) and (13), a circuit is completed to advance the four Locke drilling unit (11), (12), (14) and (15).

Note: Two of these units (14) and (15) are equipped for drilling and are mounted opposite each other at 180°. The remaining two units, (11) and (12), equipped for hollow milling, are also mounted opposite each other in a plane about ¼" above the first two.

After completing the hollow milling, and drilling two of the four holes, the Bellows-Locke units automatically retract.

. . . *Continued on page 50*



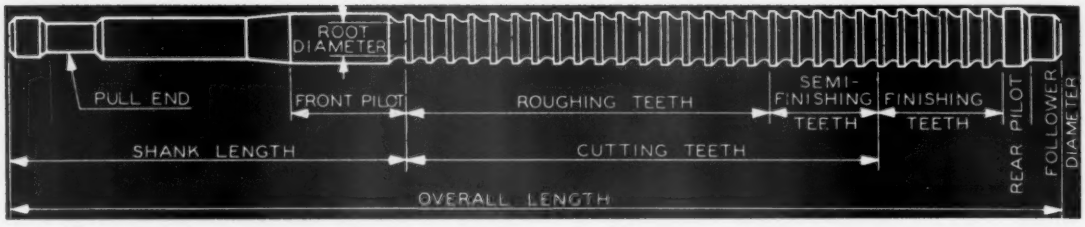


Fig. 1. A typical one pass round hole broach.

GOOD BROACH DESIGN . . .

Key To Successful Round Hole Broaching

THE BROACHING PROCESS is one of the most economical production methods available for producing smooth, accurate round holes in metal parts. Metal is removed at relatively high speed, tool cost per piece is low, quality of the finish of the produced surface is excellent and close dimensional tolerances can be consistently held.

Round hole production is a real test of broach design skill because visual inspection of the continuous finished surface readily reveals even the most minute surface imperfections. Unless every detail of the round hole broach design is carefully studied and worked out, broach life can be considerably shortened and production accuracy and finish materially reduced in quality.

Broach Design Considerations

In general, a round hole broach must provide sufficient strength, be of a length that assures adequate cutting capacity and have adequate chip carrying capacity. A pull broach must resist pulling apart and a push broach must resist buckling. Enough chip space must be provided in both to assure that compacted masses of chips will not cause tooth failure or work damage.

Adequate broach strength is provided by sufficient area through the minimum section of the broach based on the broach pull load that will be encountered by the broach. This pull load for round broaches depends on the number of teeth engaging the work, the diameter, the rise per tooth on the broach radius and the machinability of the material.

by Joseph A. Psenka
Field Engineer
NATIONAL BROACH & MACHINE CO.
Detroit, Michigan

When the minimum section of the broach has been thus established there are several critical factors that must then be considered to assure that a high speed steel round hole broach will meet production requirements.

Broach Length

This dimension is determined by the amount of stock to be removed from the part, the length of cut and the allowable chip thickness for the material being broached. The total broach length, Fig. 1, includes the pull shank, front pilot, cutting portion, rear pilot and follower end.

Cut per Tooth

Heavy cuts cause broach overloads and tool failures. Light cuts can result in loss of free cutting action and cause broach abrasion and galling as well as part galling and tearing. The usual minimum allowable cut is 0.0005″ on the diameter. On the round broaches the cut per tooth usually varies from 0.0015″ to 0.003″ on the diameter.

Pitch

This dimension, Fig. 2, is the distance from a point on one cutting tooth to the same point on the next tooth. It determines tooth strength, the number of teeth in cutting contact at a given instant, and the ability of the broach to maintain alignment throughout the cutting stroke.

Pitch is a function of the length of cut and chip thickness. The pitch of a broach for producing round holes in cast iron is thus less than that for steel.

At any given instant, at least two teeth should be in cutting contact with the work. One of the most effective broach designs for round holes is the use of differential pitch. On broaches of this type the pitch is non-uniform throughout the length of cut. Thus harmonic

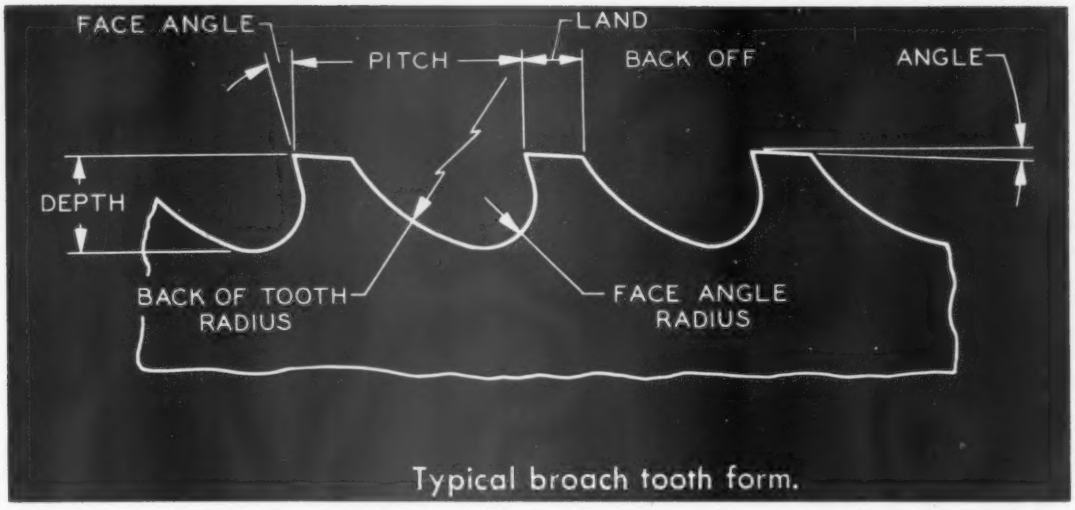


Fig. 2. A typical round broach tooth form.

machine surges that result from uniform tooth engagement are lessened and rings and chatter marks in the holes are avoided.

Chip Space

The chip space between two round broach cutting teeth must hold all the metal removed by one tooth throughout the entire cutting stroke. The chips must be allowed to fall away at the end of the stroke. Five characteristics control chip space design. These include: face angle, chip volume capacity, factor of safety for the material, and the two radii. Chip space design is thus a compromise and requires much design consideration and experience.

Chip Breakers

Teeth of round broaches tend to form continuous chip rings that would pack the chip space solid after broaching several parts. This action is prevented by notches or chip breakers in the cutting teeth. These notches are staggered from tooth to tooth so that the material left by the notch in one tooth will be removed by the next tooth.

Face Angle

The face angle varies with the hardness, toughness and ductility of the material being broached. The following are approximate face angle values for various materials: Cast iron, 6 to 8 deg; steel, 15 to 22 deg; aluminum, 10 deg plus; and brittle brass, minus 5 to plus 5 degrees.

Land and Clearance Angle

The land of a round broach tooth determines its structural strength. It can be less for light cuts than heavy cuts. The land is usually relieved by a clearance backoff, the amount of which depends on the material being broached. These clearance angles are held to a minimum to minimize loss of size when the broach is sharpened.

Part of the land of round hole finishing teeth is straight. Often this land is graduated in length from the first finishing tooth to the last to prolong broach life and improve cutting action.

The amount of land on the finishing teeth is one of the most critical factors in the successful application of round hole broaches. Too much land can increase friction, expand the part and gall the broach. Much success has been achieved recently in round hole broaching by providing narrow straight lands and decreasing clearance angles. Such broaches require much manufacturing skill and know how, but frequently they offer the only solution to round hole broaching problems.

Pilots

The front pilot of a round broach should extend completely through the work. Thus it serves both as a safety gage preventing overload on the first roughing tooth and as a guide. The rear pilot guides the part as it moves off the final finishing teeth of the broach. In general, the closer the tolerance of the broached hole, the smaller can be the difference between the diameters of the rear pilot and the finishing teeth.

Broach Surface Treatment

Experience has shown that some surface treatment processes have added from 50 to 700

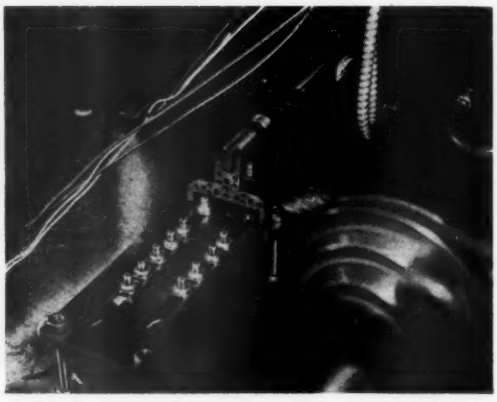
. . . Continued on page 62

. . . Standard Units, from page 47

5. The piston rod of the sequencing air motor (2) now trips the fourth set of Micro switches (16) and (17), which energize the advance solenoid of the air motor (18). As this air motor advances, its piston rod strikes a dog on the work holding fixture, rotating the part 90°, then automatically retracts.

6. The fifth set of Micro switches (19) and (20) are then tripped, by the sequencing air motor piston rod, to complete a circuit, again advancing the two Locke units (14) and (15). They drill the remaining two holes in the connector plug and automatically retract. This action completes the four holes spaced at 90° from each other.

The last Micro switch (21), when tripped by the piston rod of the sequencing air motor (2), retracts this air motor and the clamping air motor (9).



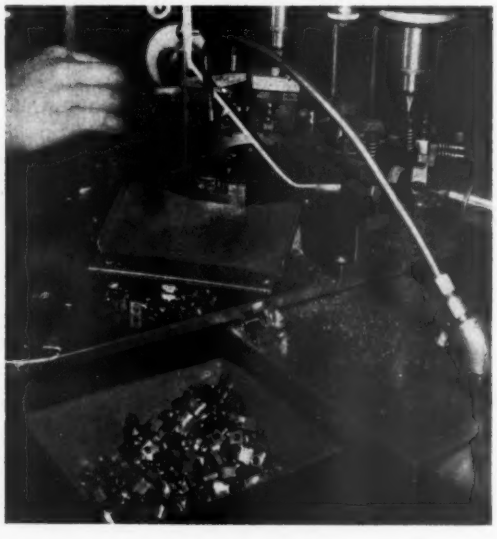
The production costs have been reduced 50% —from 16c to 8c per piece and the production rate has jumped from 60 to 300 pieces per hour. Scrap parts have been substantially reduced, tolerances held more consistently, less operator fatigue, and tool life increased by 7 to 1.

A 4-Hole Drilling Increased 16 Times

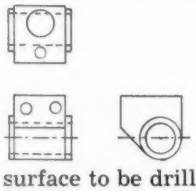
THE PART MACHINED in this operation by Horrocks-Ibbotson Co., of Utica, N. Y. is a pawl block made of free turning brass for the level wind assembly of a fishing reel. A No. 17 hole and a No. 50 hole are drilled in one surface of the block and two No. 52 holes in the adjoining surface as shown in the sketch.

The special machine built up for this job consists of four Bellows-Locke Drill units powered by three ¼ hp. motors and a ⅓ hp. motor on the unit drilling the No. 17 hole, a Bellows rotary table, loading fixtures, drill jig plates and limit switches.

Two drilling units are mounted in a horizontal position and two vertically. Because the greatest over-all dimension of the block is ⅜" it was impossible to use multiple drill heads for drilling two holes in one surface in one operation. For that reason a drill unit had to be used for drilling each hole.



The loading fixtures are constructed so that one surface of the block is in a vertical plane

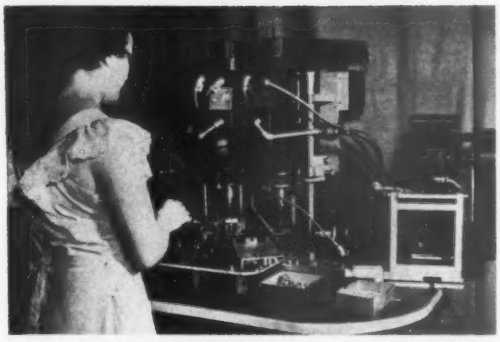


and the other surface to be drilled is in a horizontal plane.

As the operator starts the machine and loads the fixtures, the table automatically indexes to the first drilling station where a horizontally mounted drill unit drills a hole to the required depth. As the table continues to index, the two vertically mounted units drill their respective holes in sequence and the last horizontally mounted unit drills its hole.

Each loading fixture is equipped with a spring arrangement so that as the station next after the drilling is completed is approached a stationary cam contacts the spring thereby ejecting the block onto a chute.

This block was formerly drilled on a three spindle drill press arrangement with which a drill jig was used. The operator had to drill the four holes singly, which required that he

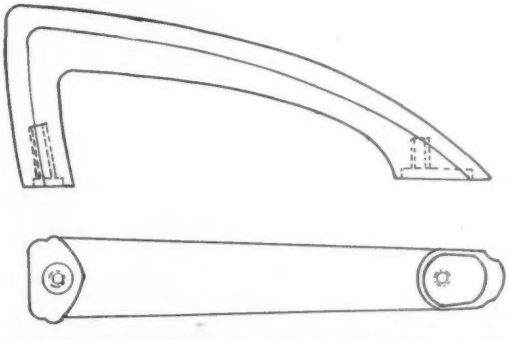


shift the drill jig from one drill press to the other to complete the job. His labor included clamping the block when loading it and unclamping it to unload it. With this setup it required a year round operation to keep up with production requirements.

This special machine will drill 1600 to 1700 blocks per hour, or 16 times as many as was formerly drilled with the old arrangement. Running the new machine one hour a day or approximately 3½ months a year supplies the year's requirements of drilled blocks.

Drilling and Tapping Increased 400%

THE PART SHOWN is a Landers Frary & Clark (New Britain, Conn.) percolator handle made of a general purpose phenolic compound. Two tapped holes are required in the handle for attaching it to the percolator. One hole is



cored in the molding process, so that one hole has to be drilled and both tapped.

The equipment used in building up this special machine includes three Walker-Turner drill presses, one Bellows 24 station rotary feed table and 3 Bellows air cylinders.

The air cylinders are mounted on top of the drill press spindles to actuate the spindles. This method of feeding the spindles was chosen in preference to standard drill press feeds, because the material to be worked was plastics and the operation would therefore permit a faster cycling.

It can be seen in the drawing of the handle that one hole has to be tapped at an angle. For that reason one drill press is mounted on an angle plate to accommodate this condition.

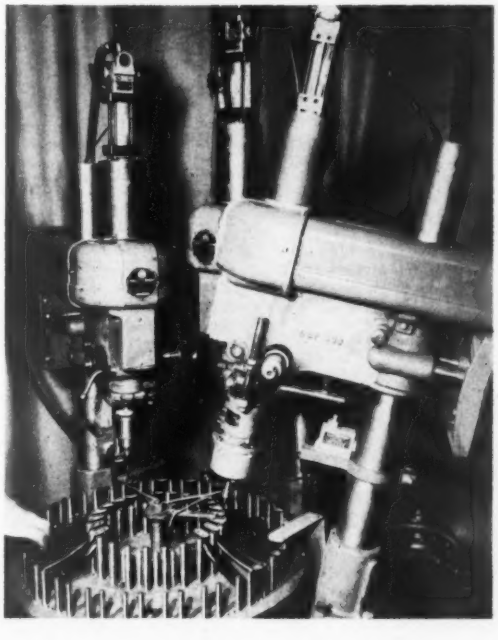
This is a setup in which the operator only loads the part into the stations of the rotary table. At the work stations hold-down plates are arranged so that both ends of the handle are held down during the machining operation. At the first work station one hole is drilled, and at the other two the respective holes are tapped. An air blast ejects the handle after the tapping of the last hole.

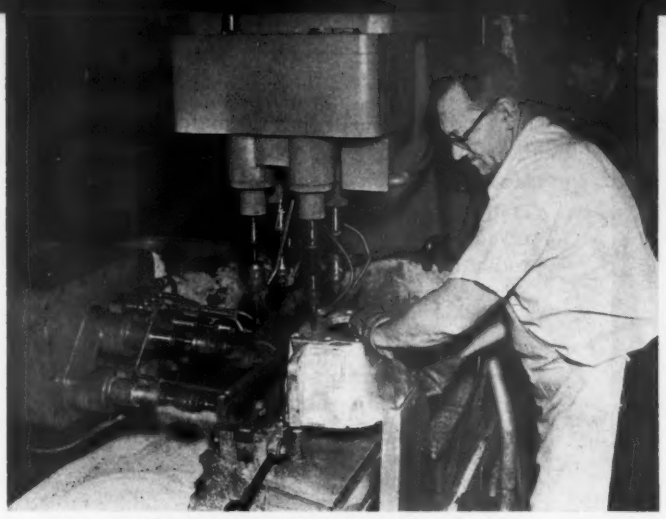
As the three air cylinders advance the spindles to the work and complete their operations they all strike Micro switches which retract them. On their retract stroke they strike another Micro switch which indexes the table. However, these three Micro switches on the retract stroke are electrically air locked and the table will not index until all three cylinders are fully retracted. After they are retracted and as the table indexes, these cylinders are again advanced by the table.

Production with this machine is 1500 handles per hour, with the added advantage of having more stable threads.

This job was formerly performed on a battery of three drill presses; with two drilling

. . . *Continued on page 54*

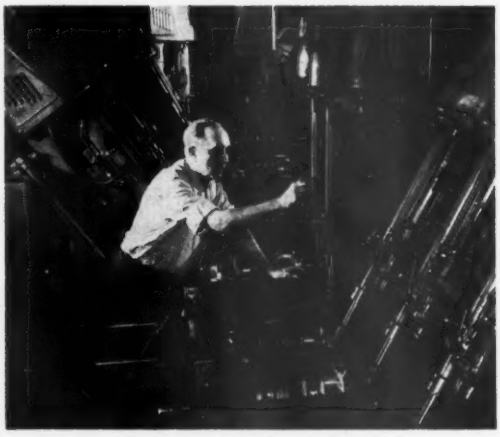




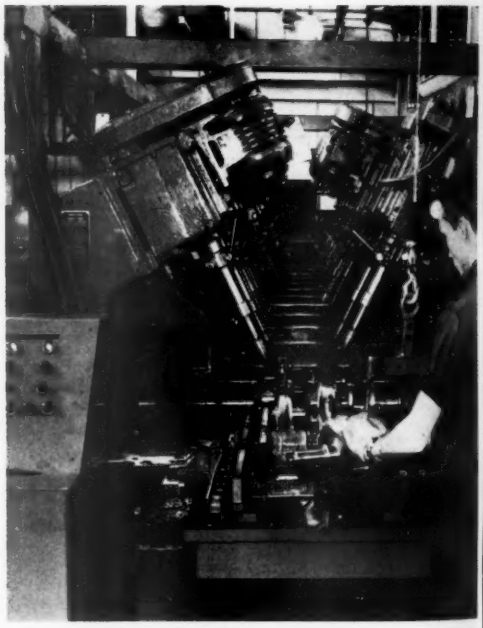
Loading a special multi-spindle Buhr drilling and tapping machine used in the machining of the torque converter housing for the Plymouth Hy-Drive transmission. Taps are mounted in special torque-operated releasing chucks which prevent excessive tap breakage.

Here, at Cadillac Motor Car, multiple rivet holes are being drilled in a ring gear on a Bullard Mult-Au-Matic.

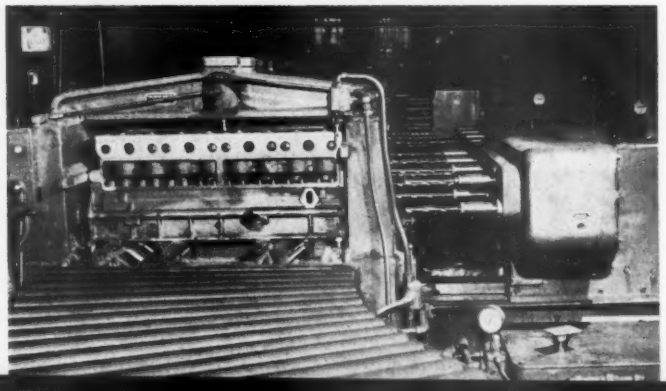
Hole Production in the AUTOMOTIVE INDUSTRY



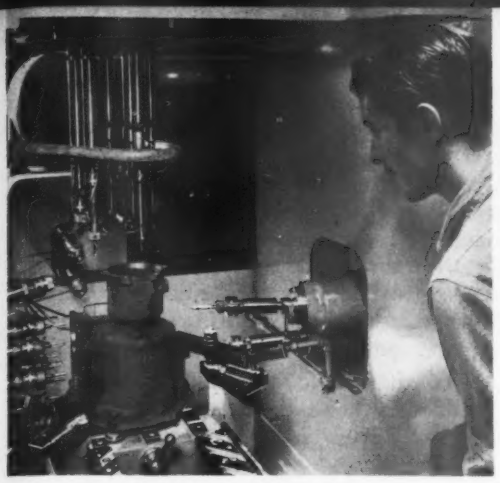
High quality mass production results from Industry's investment in special-purpose machines such as this huge 28-station, automatic-indexing transfer machine used to drill holes for the entire oil system in a Mercury crankshaft. This Avey drilling machine in Ford Motor Company's Rouge motor plant is equipped with 40 drills and four reamers. The cycle time of 22.5 minutes is required to move a crankshaft station-to-station through the machine to complete all drilling operations. Production capacity is 59 per hour, with 28 crankshafts in the machine at one time.



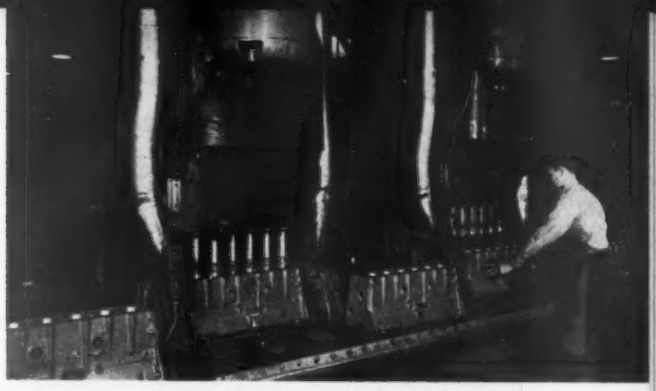
A 30-station Snyder multiple spindle drilling machine is used for drilling oil holes in the crankshafts for DeSoto "Firedome" engines at Detroit.



Horizontal spindle Footburt transfer machine at Packard Motor Car Company performs numerous hole operations on block as it is indexed from station to station.



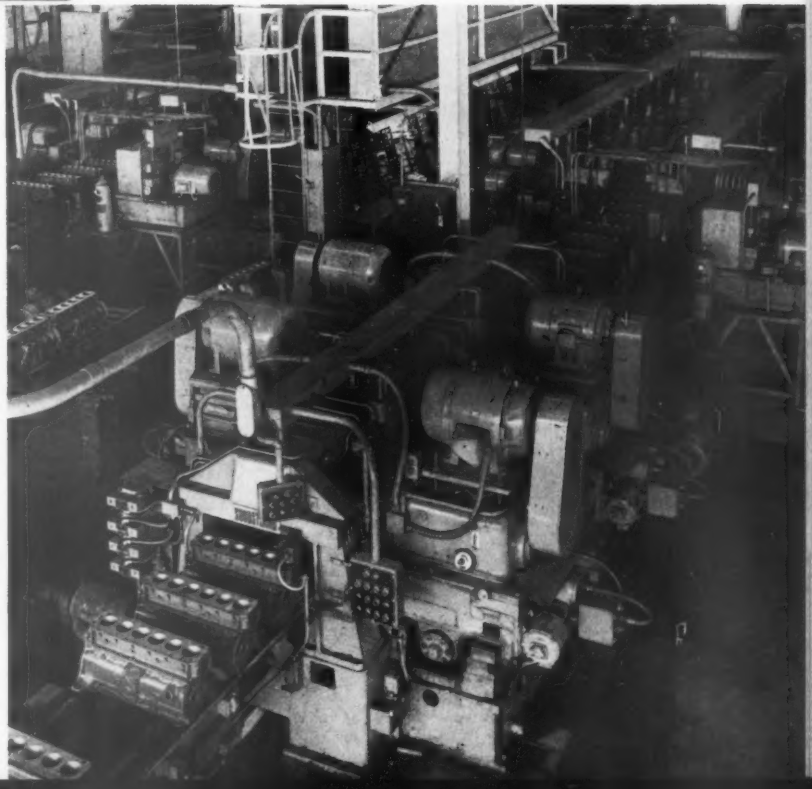
Special setup for high precision tapping of holes in the Powerglide transmission case at Chevrolet-Cleveland.



Cylinder bores being rough bored at the Chevrolet-Tonawanda plant.

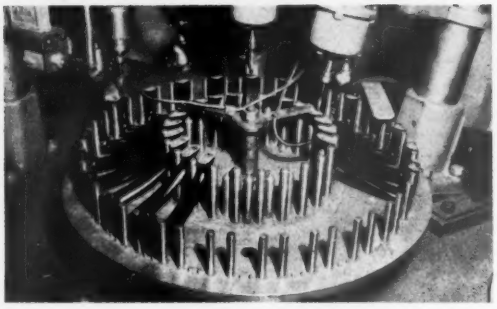
Initial drilling operations on steering gear housings are shown here being performed on Footburt and Natco machines at Chrysler Corporation's New Castle, Indiana, plant.

Compact Footburt transfer-type drilling machine at Packard Motor Car Company's plant performs both vertical and horizontal spindle operations in closely controlled production of cylinder blocks. Note location of controls on console panel for operator convenience.



Ford six-cylinder overhead valve engine-block castings are fed by automation into these multi-station transfer machines at Ford Motor Company's new Cleveland engine plant. The 30-station machine in the background performs a series of drilling, chamfering, tapping, and milling operations. Five-station machine section in foreground mills both ends of the block.

. . . Standard Units, from page 51



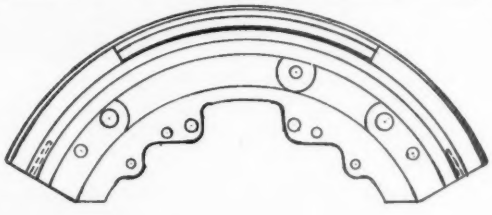
fixtures. The procedure was for the operator to load the drilling fixture, drill the one hole, unload the fixture and place the part in the second fixture for tapping the two holes. This arrangement required that the operator shift the fixture from spindle to spindle to complete the drilling and tapping of the handle. Thus two drill presses were idle during each drilling and tapping operation.

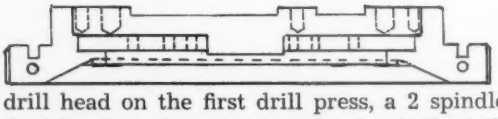
With the new special machine producing 1500 handles per hour, a production increase of approximately 400% is being realized over the old method.

19 Operations Performed in 30 seconds

THIS WORKPIECE is a cast iron segment manufactured by the Royal Typewriter, Inc. of Hartford, Conn. and is a component of the Royal portable typewriter. There are two models of this segment, A and C. Model A has 13 hole drilling and 4 reaming operations, while model C has the same operations but in addition has two counterbored holes.

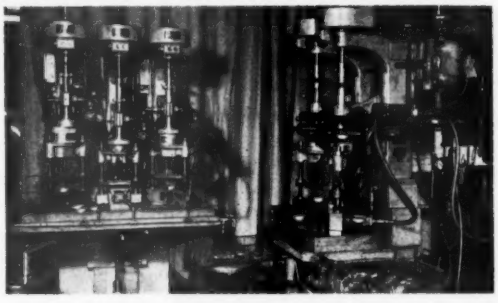
The equipment to perform these operations is made up of one unit of three Allen drill presses with a 7 spindle Thriftmaster multiple





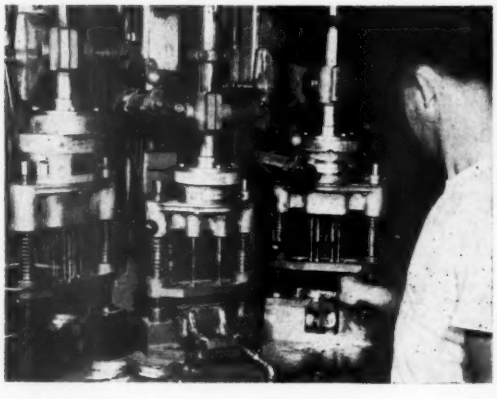
drill head on the first drill press, a 2 spindle drill head on the second, and a 4 spindle drill head on the third. Another unit of two drill presses make up the drill press equipment. A 4 spindle drill head is mounted on the fourth drill press and a 2 spindle drill head on the fifth. Each drill press is equipped with a Bellows drill press feed with Skinner valve and clamp bar. A Bellows air motor is used for the clamping operation.

To start the work cycle, the operator places a segment in the first station chuck which is closed by the clamping air motor. He then presses the starting lever and the multiple drill head descends and drills 7 holes on the top surface of the part; 5 of these are No. 32 and 2 are No. 44.



As the drill head retracts, the part is removed and chucked in the second station where one No. 43 hole is drilled in one end. On completion of this hole the part is removed, reversed, re-inserted in the chuck and a No. 43 hole drilled in the opposite end. Opposite ends of two parts are drilled simultaneously, in this operation.

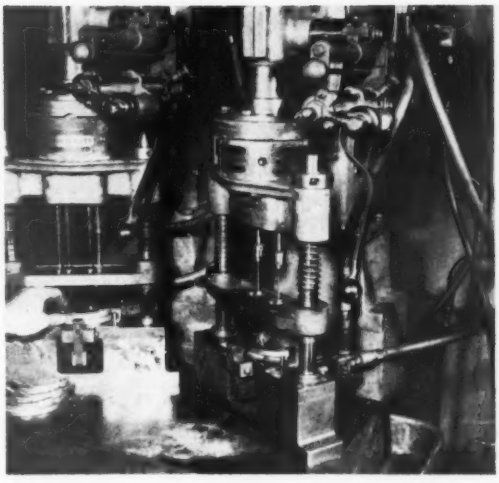
From this station the part is moved to the third drill press and two No. 25 and two No. 42 holes are drilled. When the operator has completed a number of segments on the three drill press units, he then transfers the parts to the two drill press unit and reams two holes to .165″ and two to .087″.



This completes the Model A segments but the Model C's require that two holes be slightly counterbored with No. 36 counterbore. Drilling tolerances on drilling are .002" and reaming .0015".

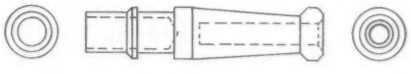
Formerly these castings were drilled, reamed and counterbored on single and two spindle drill presses which required three operators.

With the present arrangement one operator produces more drilled segments than three operators did formerly. Present production averages 160 pieces per hour on drilling and 475 pieces on reaming and counterboring. This averages approximately 260 to 280 complete pieces per hour. With this setup the 19 drilling, reaming and counterboring operations are performed in 30 seconds.



Drilling Production Increased 350%

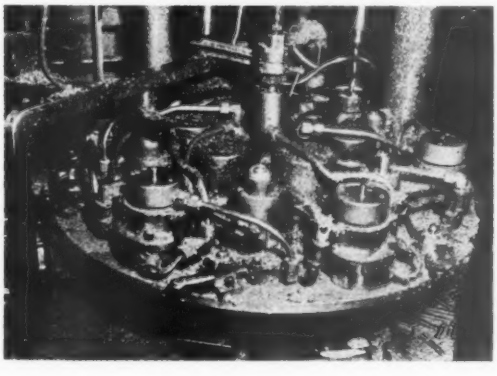
THE OSTBY & BARTON COMPANY, of Providence, R. I. specializes in small precision screw machine parts. The part shown is an



electrical connector socket made of naval brass in which a single hole has to be drilled. The hole depth is too great for one pass and the precision demanded is greater than normal.

To perform this second operation a special machine was developed by using three Delta drill presses equipped with a Bellows six station rotary table.

The stations are air-operated collet chucks actuated by cam operated valves. The presses are equipped with Bellows drill press feeds and Hydro-Checks. An air motor, four Lubro units, 2-way blow valves for ejection, Micro switches and push buttons are other pieces of equipment incorporated in this machine.



The entire action is automatic with the operator merely loading the machine. At each of three working stations the drills advance to a predetermined depth. Thus for one connector socket the first drill advances to a certain depth and retracts. The table indexes and the second drill goes deeper and retracts, then the table indexes and the third drill completes the drilling to the finished depth.

Formerly the operation was performed manually with a single spindle drill press. With this new machine, production has risen from 240 to 1080 parts per hour; making an increase of 350%.

(To be continued)

Know Your HIGH VELOCITY BAND TOOLS

by H. J. Chamberland
Field Engineer,
THE DoAll COMPANY
Des Plaines, Illinois

IN THE COURSE of research to provide industry with radically new or improved band saw blades, a project now dating back several years, engineers have made a worthwhile contribution to this worthy undertaking with the development of a machine that would simplify their use, increase their cutting efficiency and prolong tool life with a minimum of capital investment and manpower. This general-purpose band machine, industrially known as the Contourmatic, has exceptional strength and rigidity. It is therefore not surprising that it has already found its way to every modern laboratory or experimental room, tool room and production line here and many countries overseas.

Featuring an infinitely variable speed range of from 40 to 10,000 fpm, its true value is primarily based on the fact that all its movements such as blade speed, blade tension, post position, table tilt, table stroke, work feed pressure and upper and lower emergency wheel brakes are hydraulically powered and dial-controlled from a central panel. This manufacturing type of band machine is of course widely used for low speed operation which is practically to-day limited to precision sawing and filing, or when material thickness or some metallurgical factor prohibit velocities beyond the low speed range.

Exclusive of file bands, all DoALL band tools are designed for high speed operation; however, this article concerns particularly four types that are indispensable either for experimental purposes, short runs or long runs since they will cut anything from soup to nuts. That is, one type will definitely do the job if the other three cannot.

Claw Tooth Band

6 pitch: about 2 times normal size.

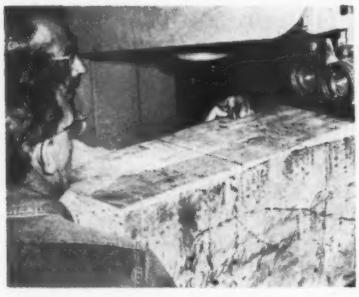


Fig. 1. Claw Tooth Band cutting heavy aluminum section

This type of band has been introduced only recently and its performance is already the talk of every shop doing considerable cutting on heavy aluminum sections, foundries specializing in light metal castings and furniture factories where the blade has been subjected to severe tests. The claw-tooth differs from other types of blading in many respects but primarily because never before has a positive rake—more acute cutting angle than 90°—been applied to bands having hardened teeth and flexible back.

While this band is not a miracle tool, because of its unusual combination of characteristics it does make the standard rule of sawing somewhat less stringent and for the following reasons. (1) The band has tougher teeth and greater penetrating power and since the chips are cleared more rapidly, it will cut considerably faster than any other type of band of similar width. (2) The high velocity range covers more applications of varying work thicknesses with fewer adjustments. It is also possible to substantially increase feeding rates in favor of both production and saw life without impairing the finish to the usual extent. (3) The band can resist heavier feeding pressures on the thicker sections without sacrificing tool life and yet give remarkably high cutting rates. In fact, the new band can be expected to cut for hours and even days on certain materials that would cripple the cutting edges and set of most saw bands in minutes. Since the band is never resharpened, maintenance costs are of no concern and by the time the tool no longer cuts efficiently, stringent quality control is a guarantee that it can be replaced with a similar band and with confidence of a repeat performance.

Friction Sawing Band

10 pitch: about 2 times normal size.

This is also a relatively new saw band especially developed for this kind of work and the process has reached a much higher level of efficiency since its introduction. The ingenious safety construction features of the Con-

Fig. 2. Friction Sawing Band cutting six gates on stainless steel generator bracket castings in one operation

tour-matic band machine makes it ideal equipment to non friction saw stainless, monel, armor plate and many other tough ferrous alloys economically at velocities ranging from 6,000 to 10,000 fpm. Heretofore, blades used for fric-

tion sawing lacked the prime essential of maximum flexation which unfortunately shortened tool life considerably. The teeth of the new friction band, by means of a unique heat treating process, remain permanently anchored and locked in place. The result is uninterrupted production for long periods due to maximum flex life as provided by the metallurgical characteristics of the band.

Most steel alloys are in the low melting point category of metals and therefore lend themselves to cutting by friction. However, in this case the material thickness should be limited to ½" as a maximum because heavier sections require band velocities in excess of that provided by the speed range of the machine concerned. Exclusive of this limitation, the 10,000 fpm maximum available is by far adequate for the other three blades to cut their respective materials and regardless of the thickness involved.

When friction sawing, Rockwell hardness of the material is not a factor and neither is tooth sharpness. The fact remains that the band must necessarily have teeth to perform its intended functions, one of which is to readily carry off the material directly in front of the teeth as it is reduced to a state of plasticity.

Any claim to the contrary that a band needs no teeth to friction saw should not be taken seriously; laboratory tests have shown both sides of the picture to the satisfaction of all friction sawing experts. The practical friction sawing material thickness is 1", however, trouble is often experienced when attempting to cut sections exceeding ½" and consulting technicians to that effect always proves a profitable step on the part of management.

Line Grind Band

Approximately 2/3 actual size.

A new machining technique came into being with the simultaneous development of the Contour-matic and a specialized band

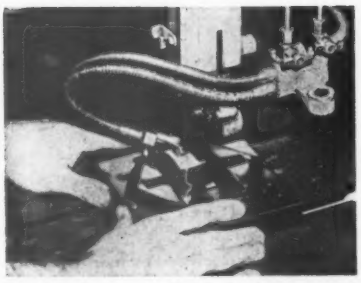


Fig. 3. Aluminum Oxide Line Grind Band removing broken section from hardened die for use of insert

tool utilizing aluminum oxide or silicon carbide matrices as cutting elements. This is the first and only cutting tool and machine combination that will do precise "vertical grinding" and particularly execute internal and external contour cuts. Chief applications for this unique cutting process are the contour cutting of hardened dies, tools and high temperature alloys. Line grind bands are effecting tremendous savings in high cost materials and high rate labor by salvaging broken dies, dies that have shrunk in heat treating and other tools and parts that would otherwise have to be scrapped or repaired at tremendous costs. Line grinding vertically makes it practical to cut a work thickness within the machine's capacity, and to negotiate straight lines and radii limited only by width of band. For internal grinding, as with other types of band, the band is threaded through a starting hole and re-welded.

Line grind bands are available in a ⅞" width only and in grit sizes of 54 and 80. Aluminum oxide grits are intended for hardened steels, heat-resistant steels and most wear-resistant nonferrous alloys. Although some wear-resistant nonferrous alloys respond more efficiently to silicon carbide grits, the bulk of applications for this band consists of geological, silicified and vitrified materials; glass, quartz, marble, granite, etc. Line grind bands require velocities of 5,000 to 6,000 fpm, however, 5,000 fpm is the predominating speed and therefore material thickness has negligible effect on choice of velocity. Under average conditions, some aluminum oxide bands have resisted 70 square inches of cutting on hardened steels; silicon carbide bands may be expected to cut at least 300 square inches of 1" glass. Aluminum oxide bands require occasional dressings whereas silicon carbide grits have a tendency to naturally break down to continually expose new sharp points.

Diamond Tooth Band

Approximately actual size.

This type of band is intended to perform similar functions as the silicon carbide band except that it utilizes the physical properties of the diamond as a cutting tool. When to use which and for what depends entirely on the factor of cutting rate versus blade life. For production

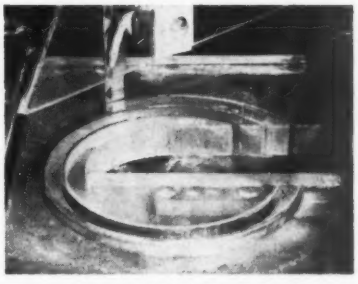


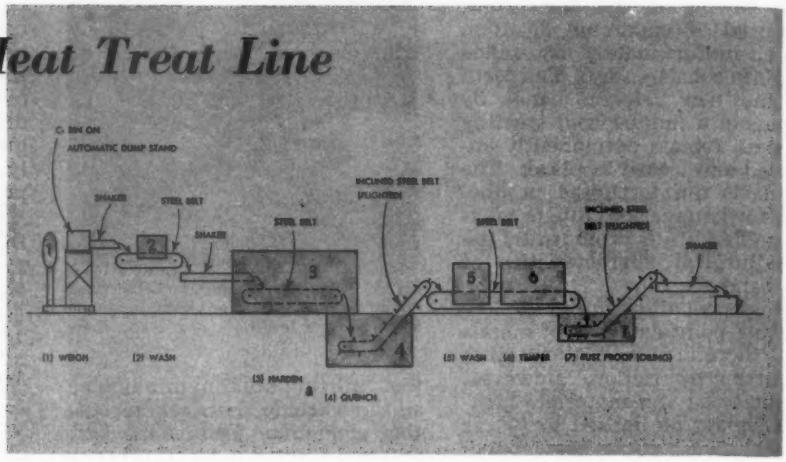
Fig. 4 Diamond Tooth Band circular cutting optical glass. This particular band tool is indispensable to the experimental room of the modern plant because of its many and diversified applications

sawing on the thicker sections of refractory, ceramic, vitrified, vitreous and geological materials, the diamond band is more economical in the long run although its cutting rates are lower than that of the silicon carbide band. On the other hand, silicon carbide bands should be given the preference for experimental and periodic use because of their comparatively lower initial cost and most satisfactory life expectancy.

Irregularly-spaced, diamond-impregnated cylindrical segments electronically brazed to a band of special steel form a vibrationless cutting edge. Diamond tooth band operating speeds range from 3,000 to 8,000

... Continued on page 166

Automatic Heat Treat Line

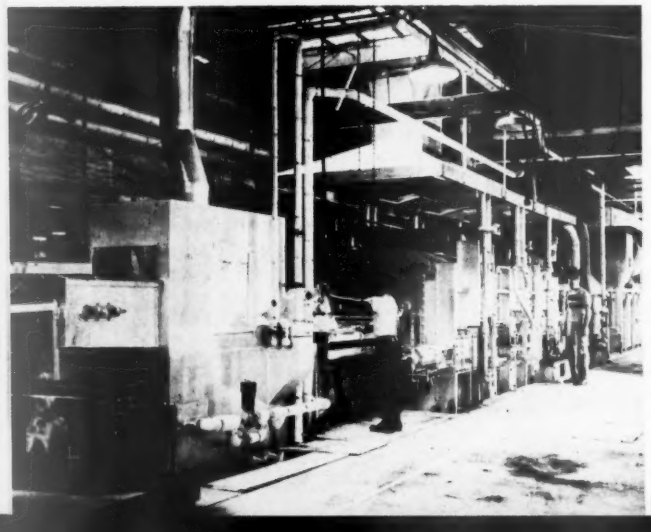


UP TO 50,000 socket screws an hour are being automatically processed through a series of seven operations on the new high production heat treat line at Standard Pressed Steel Co.'s plant in Jenkintown, Pa. Complete processing requires two hours.

All operations are timed and tied together by a series of power belt and shaker conveyors. From the time "C" bin loads of screws are dropped by fork truck on the weigh scale until the screws are again returned to "C" bins after rustproofing at the far end of the line, all handling is fully automatic.

Built around a 30′ radiant tube hardening furnace and a special gas-cracking unit that provides a precisely-controlled inert atmosphere for the heat-treating process, the entire 110′ line cost SPS close to $200,000. This is but one phase of a $10,000,000 expansion program that has, in the past three years, modernized and enlarged company facilities for the production of all its major industrial products.

The new line, designed and installed by Surface Combustion Corp., is intended primarily for large scale runs on standard items—such as the Unbrako line of socket head screws—but can economically process large or small batches of specialized aircraft fasteners or any type threaded fastener. A switch can be made from one product to another and back, with minimum lost production time.



According to Joseph P. Villo, SPS superintendent in charge of form and finish, the heat treat line is as far advanced as any piece of heavy production machinery in the precision handling of threaded fasteners. Product flow and the design and working relationship of conveyors, shakers, and gravity drops were carefully planned to prevent nicking of threads and marring of surface finishes.

Highly accurate control of fastener hardness and finish quality is promoted by the auxiliary gas-cracking unit that supplies an inert atmosphere of constant temperature and composition to the hardening furnace.

The protective atmosphere prevents scale formation and decarburization. Through a few simple adjustments, the cracker can be set to supply the exact amount of carbon recovery needed. Actually, with the gas-cracker, the hardening furnace can be operated as a carburizer—adding controlled amounts of carbon to the case to build up a hard shell around a relatively mild steel.

Processing Procedure

Screws come to the new automatic heat treat line in "C" bins from nearby machining areas. The bins are identified and segregated in a small storage area, where they remain until ready to be dispatched through the line.

The operator at the beginning of the hardening line picks up the bins by overhead chain hoist, lowers them—one by one—onto a counting scale. The count is immediately sent

... Continued on page 170

A typical one-of-a-kind tool room job: milling the flutes of a special h.s.s. drill. CINCINNATI No. 2MI Universal Miller.

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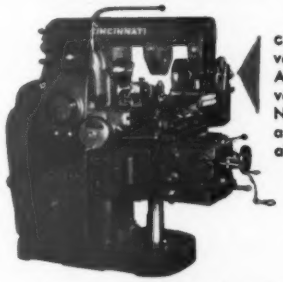
A production job: milling the "V" edge of a cast iron clamping element. The parts are held in a two-station fixture, mounted on the table of a CINCINNATI No. 2MI Plain Miller.



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CIRCLE INFORM-A-GRAM KEY NO. 59

DIAMOND SLUDGE RECOVERY

by F. J. Lennon, Jr.
General Superintendent
KENNAMETAL INC.
Latrobe, Pennsylvania

The grinding machine coolant with its burden of sludge runs over the filter material via the troughs at the left. As the accumulating sludge reduces the flow through the filter, the coolant level rises. The float valve-switch is actuated, thus powering the conveyor to feed clean filter material into position under the incoming coolant. From the resultant filter cake (sludge) the diamond content can be reclaimed.

Today, one of the most important matters that should be considered by all users of diamond grinding wheels is the proper facilities for recovery of the diamonds from the grinding sludge. With the supply of diamonds for industrial purposes critically short and the situation becoming continually worse, there is no justification today for wasteful practices.

From accurately compiled reports, it is evident that the supply of diamonds to be made available will not increase in proportion to the increased demands. For example, the cemented carbide industry anticipates an increase in carbide production of over 25 percent in 1953 as compared to 1952, while the supply of diamond bort for industrial uses will show very little increase. From existing trends we can expect that carbide production will continue to increase at a much higher rate than the diamond bort supply. Consequently, we must make our supply of diamonds stretch just as far as we possibly can.

One way to do this is by installing effective facilities for recovering diamond particles.

An installation at Kennametal Inc. in Latrobe, Pennsylvania, that has worked out very well consists of a full flow filter unit that removes solid abrasives and sludge continuously from the coolant as it comes from the work.

The unit shown here was manufactured by the Delpark Corporation in Lebanon, Indiana and is used to filter the coolant from two large surface grinders at the Kennametal plant.

The filter material rests on a flat endless conveyor and filters the solids from the coolant that flows from the machine by gravity. The filter cake is built up on the filtering material and carried in a relatively dry state to an outside container. When the flow through the filtering material is reduced by the solids held upon it, the liquid level rises and a float valve is raised, actuating a switch which causes the conveyor to automatically move forward and bring clean filtering material into position.

The unit installed at Kennametal is doing an excellent job in retaining the diamonds in the sludge. Where any quantity of diamond grinding is done, the original cost of the equipment is soon paid for in recovered diamonds.

Several companies are manufacturing similar units which will probably do an equally satisfactory job. The price of such units will range from $500 up, depending on the volume of coolant to be filtered and the type of coolant.

Several companies today are in the business of recovering diamonds from grinding sludge, swarf, and worn wheel stubs.

Editor's note: The following information was embodied in the text of Mr. Lennon's article. We have set it apart here for easier reference.

"In addition to the Delpark Corporation of Lebanon, Indiana, filtering machines for this purpose are built by:

The U. S. Hoffman Co.
219 Lamson Street
Syracuse, New York

The Henry Equipment Company
P. O. Box 219
Bowling Green, Ohio

The Barnes Drill Co.
Rockford, Illinois

"The following companies can provide the required help in getting the diamonds from the filter cake and will generally purchase the diamonds themselves from the sludge supplier:

Diamond Dust Co.
15 West 44th St.
New York, N. Y.

C. W. Danforth Laboratory
P. O. Box 448
Youngstown, Ohio

National Research Co.
25530 Little Mack Ave.
St. Claire Shores, Mich.

Industrial Diamond Powder Co.
P. O. Box 613
New Kensington, Pa.

Mineral Research
32420 Harper Ave.
St. Claire Shores, Mich.

Diamond Reclamation Co.
2739 Lockport Road
Niagara Falls, N. Y.

National Biochemical Co.
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THE MOTCH & MERRYWEATHER MACHINERY CO.

Cutting Tool Manufacturing Division
Cleveland 13, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 61

. . . Broach Design, from page 47

percent to the service life of round hole broaches. These processes increase surface hardness, increase resistance to corrosion, and reduce friction between broach and work. Added up they mean that round hole surface treated broaches can be operated at high cutting speeds without affecting work quality or broach life.

Special Broach Designs

Where scale or work-hardened surfaces offer round hole production problems, special broach designs can be provided. Some of these designs have cutting teeth arranged so that parallel segments of the round hole surface are progressively cut from the solid stock, portions of which remain at the sides of the cutting tooth. Final finishing teeth in these designs are full round.

Fig. 3. Strip broaching automotive rocker arms on a vertical broaching machine.

Other designs have teeth arranged to take heavy initial cuts which assure that cutting edges get below the scaley or work-hardened surfaces.

Burnishing sections, too, can be provided as an integral part of round hole broaches. Inserted-tooth or built-up broaches are also often provided for broaching round holes where the design would result in economy of use of the high speed steel or other costly material. These designs also can provide limited size adjustment to compensate for sharpening.

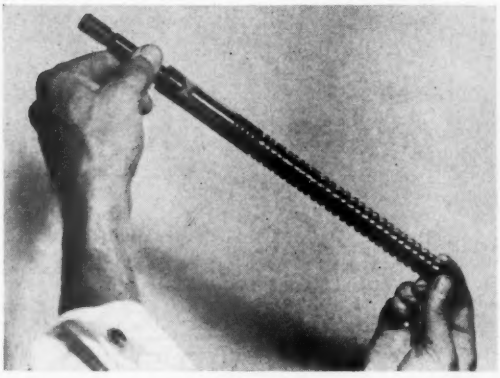

Fig. 4. The combination round hole and burnishing broach that strip broaches rocker arms on the setup in Figure 3.

Typical Round Hole Broaching Production Operations

One method of round hole broaching that is highly productive but requires extremely careful broach design is strip broaching. In this method a broach is pushed through a part and retracted through the broached hole. On a broach of this type, the amount of land and type and amount of backoff is a critical factor since excessive lands can cause part galling and broach wear when the broach is pulled back through the part.

Strip Broaching

Two automotive engine rocker arms are produced at a time by strip broaching on the vertical broaching setup shown in Figure 3. The rocker arms are inserted in the sliding fixture shown below the broaches. Then the fixture is slid under the ram, the broaches pushed through the parts and retracted, and the fixture slid out to remove the finished rocker arms. The fixture holds four rocker arms, permitting it to be loaded at alternate sides during the broaching operation.

The broach for this operation, Figure 4, combines many features which, after being included in the design, increased tool life 400 percent, eliminated one broaching operation, cut tool cost 87½ percent, improved surface finish and eliminated a size problem.

Among these features are differential pitch spacing, decreasing backoff angles, narrow parallel lands, flat-type chip breakers to avoid streaking, and integral burnishing buttons that produce a burnished finish in the hole.

A finished diameter of 0.813″ is held to a 0.001″ tolerance throughout the varying cross-sections of the malleable iron rocker arm.

. . . *Continued on page 64*

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CIRCLE INFORM-A-GRAM KEY NO. 63

. . . Good Broach, from page 62

Fig. 5. Broaching hypoid gear blanks on a pull-up broaching machine.

A Built-Up Broach for a Large Round Hole

A 5.609″ dia. hole in a forged steel automotive rear axle hypoid gear blank is produced by a built-up broach to a 0.001″ tolerance on the vertical pull-up broaching machine shown in Figure 5. In this operation the gear blank is loaded on a sliding fixture, the blank slid in under the ram, the broach pulled up through the part, the part slid out and removed, and the broach returned to start position.

Production of an accurate, smooth finish hole in this part had been a production problem. The gear blank is a typical thin cylindrical section that is easily expanded if too much parallel land is provided in the broach. When this condition existed, part galling, excessive broach wear and dimensional tolerances were serious problems.

The broach now used, Figure 6, is a shell-type design that conserves costly material by using a high speed steel outer broach shell and a low carbon steel broach body. All teeth on this broach have narrow parallel lands and decreasing backoff angles. Broach life with this design is excellent and parts are readily produced to tolerance specifications.

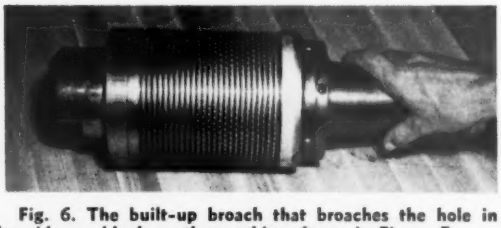

Fig. 6. The built-up broach that broaches the hole in hypoid gear blank on the machine shown in Figure 5.

A special broach solved a hole size problem on the forged steel automotive front suspension knuckle support being broached on the horizontal twin ram broaching machine shown in Figure 7. On this machine the 0.863″ dia. long king pin hole is broached on one knuckle support while another part is loaded in broaching position in front of the second broach.

The tendency of the surface of the hole to work-harden in the drilling operation presented a combined broach abrasion, hole surface finish and tolerance problem. The broach that solved the problem is a Red Ring patented

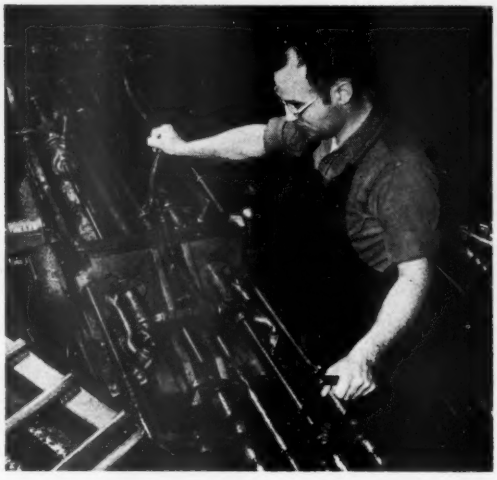

Fig. 7. Automotive steering knuckle supports being broached on a twin ram horizontal broaching machine.

Modified Double Jump design. In this broach the first tooth sections are essentially spline teeth that remove about half of the cold-worked surface. This reduces the pull load on the broach. The next broach tooth sections have round teeth that remove the remainder of the spline section. The rest of the broach teeth are designed as any conventional round broach. The finishing teeth have narrow lands that reduce friction and tendency of part to expand, and also assure optimum cutting action. The hole is held to a 0.001″ tolerance by the broaching operation.

INDUSTRIAL NEWS

The Bristol Company has just completed an expansion program which greatly increases its capacity to manufacture Bristol Multiple-Spline and Hex Socket Screws. The new facilities include a new building and the latest types of precision equipment for manufacturing and heat treating socket screws of all kinds and sizes.

Punching 7,000 holes in 90 seconds with the BLISS perforating press!

Each hole precisely located and burr-free on wrap-around stamping for Lovell dryer

TWO NEW BLISS S-2 PRESSES team up at Lovell. Each has 175 tons capacity. At left: forming a dryer inner drum head. At right: piercing a cylindrical exhaust duct.

Take a sheet of 0.037 steel, 19" x 77", then pierce out 67% of the area with 7,000 precise perforations. And do it continuously day in and day out at the rate of one every 90 seconds. That's how Lovell Manufacturing Co., Erie, Pa., produces its dryer wrap-around stamping with a Bliss No. 875 High Speed Perforating press. Average speed is 160 strokes per minute with a 64 punch tool.

Press accuracy and rigidity are extremely important to insure exact alignment of the comparatively fragile punches. A specially-designed Bliss feeding mechanism, built-in safety devices and accurate back gages guard against miscuts.

But dependable press performance is not unusual at Lovell. For Bliss presses have been their first choice since 1918. Today, 66% of Lovell's stamping equipment is Bliss-Built. As Tool Superintendent Raymond F. Neider points out, "Our Bliss presses have stood up well under steady operation—often through double shifts. They are rugged, yet easy to operate and maintain. But then they have to be good or we couldn't depend on them as we do."

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How to SELECT PRECISION SWITCHES

◆ PART TWO ◆

by A. L. Riche
Vice President
MICRO SWITCH
Division of
Minneapolis-Honeywell Regulator Co.
Freeport, Illinois

Installation

Switches to be operated constantly in the presence of oil, moisture, spray or dust should be of sealed or moisture resistant design. Improvised shielding of the switch is the best alternate for this. Most switches are satisfactory for use within the temperature range of 0° to 160° F. Beyond these points, the switch manufacturer should be consulted.

Wherever possible, the switch should be mounted so that the actuating force is in direct line with the movement of the switch plunger. Switches may be mounted directly to a structural member of a machine, die, or fixture or to a panel or bracket. When mounted to a metallic section, the switch should be insulated from it by fibre or glass cloth to eliminate the possibility of shorting.

Applications

The range of application for precision snap-action switches is practically unlimited. Their use in the average plant has historically been primarily to ensure safety of operator and machine. A few examples are illustrated in Figures 4 - 10. Beyond the safety functions of these devices, they are being employed more and more in automatic cycling of machine operations to lessen the human variable and to increase machine productivity in general.

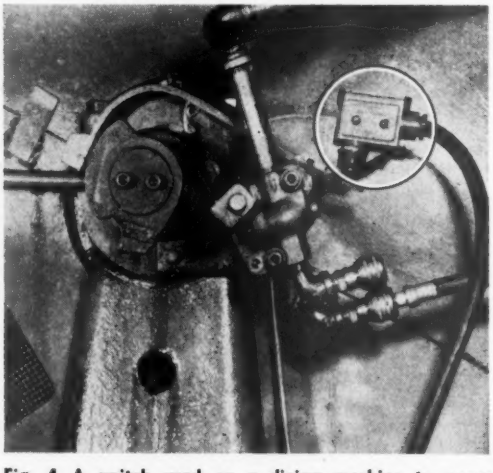


Fig. 4. A switch used on a dieing machine to prevent machine operation with the inching bar in place.

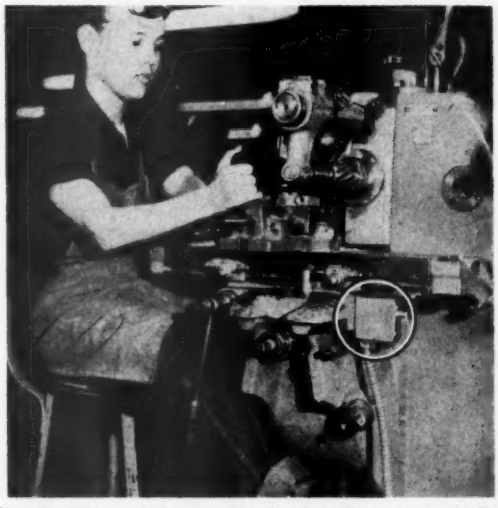


Fig. 5. The switch on this hand miller automatically stops motor and cutter for unloading of fixture.

A purely safety type of application is seen in Figure 4. As a protection against this dieing machine being started with the inching bar in place, a guard was placed over the flywheel shaft so that it had to be lifted in order to use the bar. The other end of the guard actuates a switch (upper right) wired into the power circuit ahead of the motor. Any time the inching bar guard is lifted, the machine is stopped and cannot be started until the guard is returned.

On the hand miller (Fig. 5), a double-pole, double-throw switch is actuated by a limit stop on the carriage. At extreme forward travel of the carriage, the switch is actuated, shutting off the power, and operating a magnetic brake to stop the motor and milling cutter immediately. If an air-operated fixture had been used, the switch could also have released the clamping pressure.

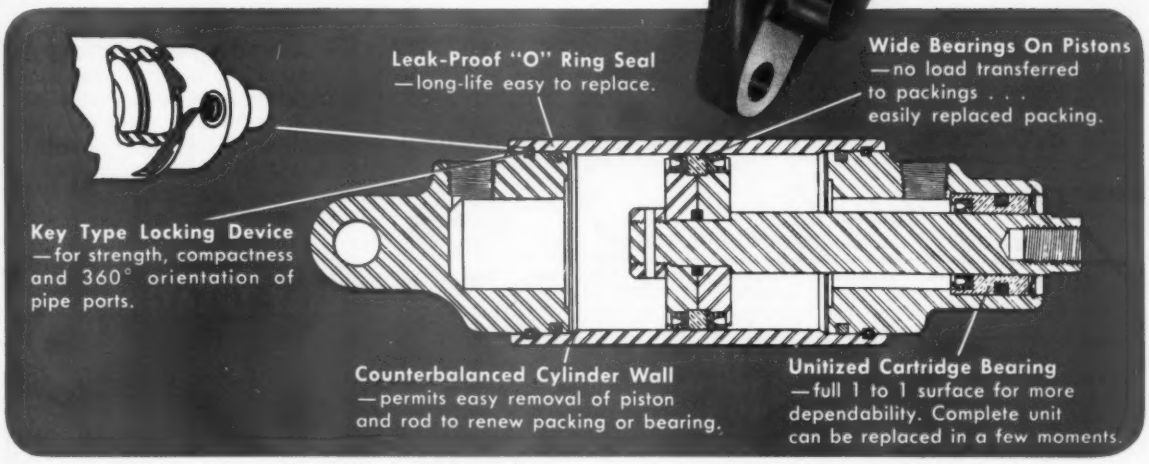
... Continued on page 120

ANNOUNCING

NEW

CARTER CYLINDERS

The new Carter air or hydraulic cylinder has everything for successful, long wearing application. Carter cylinders are available in a complete range of sizes with stroke length up to 18 feet with 8-inch diameter in standard models. They have a full 6 to 1 safety factor. No tie rods . . . no bolts! A Carter cylinder is smaller but stronger!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COMPACTNESS: Carter cylinders have a minimum outside diameter for any given size. They require one third to one half the space of other cylinders.

STRONGEST THOUGH SMALLEST: The head and mount are secured to the cylinder wall by stainless steel internal locking keys. This is the strongest possible union yet permits full 360° rotation of head mount for easy pipe port orientation.

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THE Lakeside Steel Improvement Co.

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CIRCLE INFORM-A-GRAM KEY NO. 66.2A

Industrial News

Truman E. Longley Co. The appointment of the Truman E. Longley Co., of Cleveland as northern Ohio representatives for Carter air and hydraulic cylinders has been announced.

Longley emphasizes that the new Carter cylinders supplement the line of Bendix-Westinghouse (diaphragm type) air cylinders handled by Telco for many years.

The new Carter air and hydraulic cylinders feature many design improvements over other plunger type units. Carter's head and mounting ends are united with the cylinder wall by internal locking keys that give a combination of extreme strength and easy pipe port orientation, because the lock ring construction allows full 360° rotation of head mount.

The new Carter cylinders are made for operation with air up to 150 psi or hydraulic at 750 or 1500 psi. in a wide range of standard sizes and various stroke lengths up to 18 feet. Six different mounts are available for various applications. Sales will be handled by Telco's Tool Division.

American Roller Die Corp. announces the completion of its new plant and offices at 29501 Clayton, Wickliffe, Ohio.

The new factory is of single floor design, and modern layout and planning throughout are combined with precision tooling and assembly methods. The vastly increased floor space will add considerably to Ardcor production capacity of; Roll Forming Machines; Tubing Mills; Forming Rolls and Tubing Rolls; and Straightening, Pinch and Leveller Rolls, for which the company is recognized as a leading manufacturer in both domestic and foreign markets.

The corporation is headed by Harry J. Eisenman, President. Robert Akers is Vice-President and Secretary.

The Lukenheimer Co. Facilities for producing steel and iron valves at its Carthage, Ohio plant are being expanded to meet the growing demands for these products, particularly for steel valves, according to P. M. Arnall, president of the Lunkenheimer Co.

Due to the growing demand for steel valves in the power, atomic energy, petroleum, chemical and other important industries, along with Lunkenheimer's more aggressive solicitation of steel valve business in the past three years, production facilities have been taxed.

Steel and iron castings will be supplied to Lunkenheimer specifications by outside sources, which necessitates adjustment in the foundry working force and allows Lunkenheimer personnel to devote their full time and efforts to the production of steel and iron valves.

Arnall says, "the famous breech lock steel valves so widely known and used in high-pressure, high-temperature installations in power plants, along with all other pressures of steel and iron valves, will be made available in sufficient quantities to supply the increasing needs of customers and prospects."

HEAT TREATING

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CIRCLE INFORM-A-GRAM KEY NO. 66.2B

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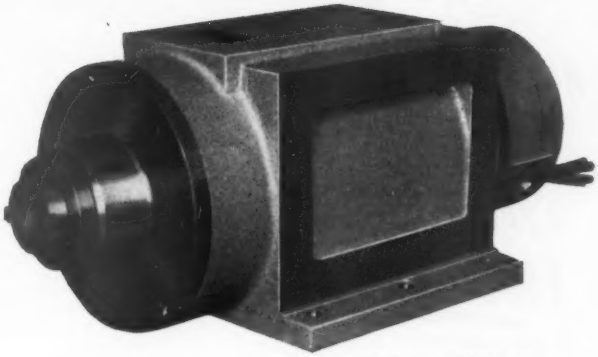
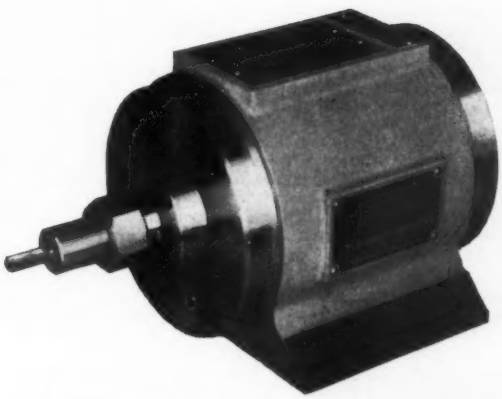
These Heavy Duty, High Speed Milling Spindles can be furnished in a wide variety of horsepowers and speeds, ranging from ½ h.p. to 100 h.p. and from 3600 r.p.m. to 60,000 r.p.m. They are unequalled for long life, trouble-free operation and rugged ability to cut metal fast.



20 h.p. at 7200 r.p.m.
40 h.p. at 14,400 r.p.m.

These Spindles are arranged to operate in horizontal, vertical or angular position, whichever you specify.

15 h.p. at 14,400 r.p.m.



2 pole — 4 pole motor ¾ h.p. at 12000 r.p.m.
½ h.p. at 6000 r.p.m. 1 h.p. at 18000 r.p.m.
1½ h.p. at 36000 r.p.m.

POPE designs and builds *special* High Frequency Spindles for a great range of applications. For recommendations and quotations, let us have your specifications.

No. 97

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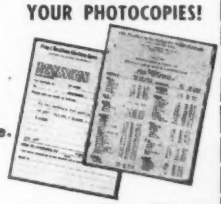

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CIRCLE INFORM-A-GRAM KEY NO. 68

. . . Month's Talk, from page 35

handle the grain, practically automatically, all the way from the carrier delivering to tne mill until it is in packaged form going out of the door. About the only place that further automation may be accomplished is after packaging, to the warehouse and to the shipping dock, and freight carriers.

In the tin can manufacturing line, there is further room for automation and this is now being developed.

First, the tin plate sheet as it comes from the mill must be slit to the proper width of strips according to the size can being made. This is very often done as a separate operation and, when completed, strips are loaded on pallets or skids to be delivered to the bodymaking machines.

It seems very practical and logical that the tin plate can be put through the slitter and automatically placed into the bodymaker magazine.

The next item on which work can be done is the making of the top and bottom of the can, and automatically delivering them to the magazines of the seamers.

These tops and bottoms have, in some cases, been made in two or three operations. A duplex die could possibly eliminate some of these operations, but the theory should be that the press operate at the proper speed so it could automatically deliver to the seamers the correct quantity per hour of tops and bottoms, and deposit them into the magazine which feeds the seamer.

After the can is finished, it is shipped in a container to another plant. Here the operation is generally done by hand to stack or package them in either the crates or the kraft bags. If this operation would be made automatic, it would show considerable savings and, no doubt, would increase production, because at times the handling of these cans will stop a line of the can making machinery because they are so far ahead of the packers.

The sorting of bumper brackets, placed on a tray by an operator, can be made automatic, eliminating any mixing of the brackets in the quenching operation, and bring them out in separate lines to permit automatic pick-up, and discharge them as described earlier.

There is no set rule on the exact approach or formula by

. . . Continued on page 70

UNBRAKO SHOULDER SCREWS have these features: heat treated alloy steel for strength; knurled head for sure finger grip, fast assembly; accurate hex socket for positive internal wrenching; shoulders held to unusually close tolerances; threads and head concentric with body for uniformly accurate assembly; finished threads close to shoulder; fully formed threads, Class 3 fit; standard sizes, ¼" to ¾" in a full range of lengths.

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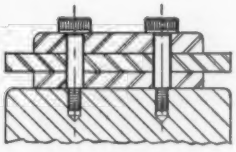
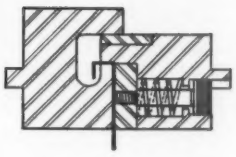
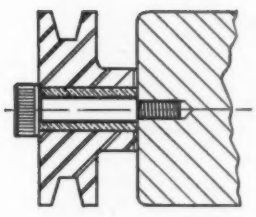


Use UNBRAKO Shoulder Screws as stationary guides and as moving shafts or pivots.



For pressure pad and stripper plate applications.



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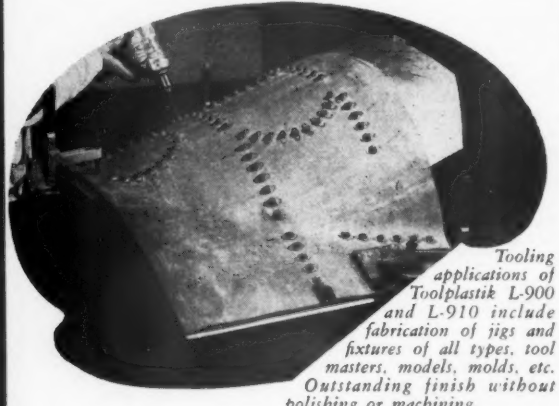

Tooling applications of Toolplastik L-900 and L-910 include fabrication of jigs and fixtures of all types, tool masters, models, molds, etc. Outstanding finish without polishing or machining.

To acquaint the tooling industry with its new line of laminating resins, Rezolin, Inc. has available a Laminating Pilot Production Kit. Contains everything needed to construct and evaluate a laminated tool. Send $15.00 for postpaid kit, or write Dept. A for free information.

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CIRCLE INFORM-A-GRAM KEY NO. 70

REZOLIN TOOLPLASTIK

. . . Month's Talk, from page 68

which to determine what is subject to automation and readily adapted to automation.

One of the practical ways to get a germ of an idea is to study the simplest movement through which the product must be manipulated and positioned for each operation. The next step is to imagine what mechanical mechanisms will perform the movements necessary. We also should consider changing, if necessary or possible, the sequence of operations to reduce manipulation to a minimum. Many "Rube Goldberg" ideas can be reduced to a reasonable and practical mechanism by keeping an open mind. In some cases, completely forget the present way you are producing the product and look for different ways which may lend themselves more readily to automation.

With the open mind approach, you will soon recognize certain basic mechanical requirements that dictate the basic design and help simplify the selection of mechanisms, types of material, and controls when involved. When more than one type of mechanism or material, etc. seems feasible, make your selection, first, on the suitability of the items in question, and, second, on cost. Many expensive mechanisms are failures because an accessory with a cost difference of a few dollars was selected. Imagine equipment which costs $1,000.00 to build being equipped with a non-precision bearing costing fifty cents, compared to a high precision bearing costing $1.10 each. Savings of this type can wreck a project and discourage management in appropriating further funds for automation.

The type of movement should be considered, whether it is in a straight line or an arc. Momentum of speed also enters into the decision, because centrifugal forces or inertia may or may not help to position the item under consideration.

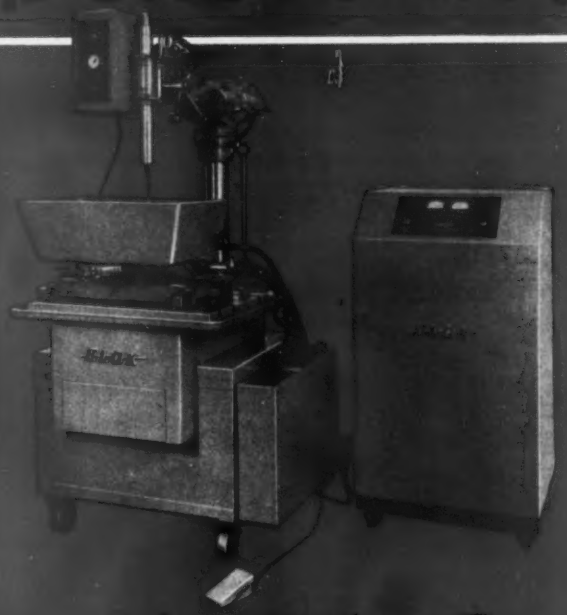
It is not good practice to confine automation mechanisms to too small a space when more space is available, because the first attempts may require refinements, and extra space to expand is very helpful in perfecting successful automation.

The type of energy must be selected to suit the manipulation of the parts to be handled. Elec-

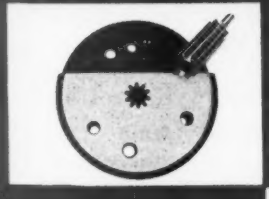
. . . Continued on page 73

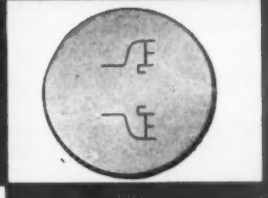
ifweshowyou ifwetellyou

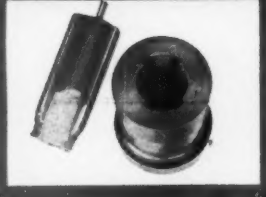
Will You Believe Us!



a few M-400 jobs







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CIRCLE INFORM-A-GRAM KEY NO. 71

PROJECT TINKERTOY . . . Modular Design of Electronic Components and Mechanized Production

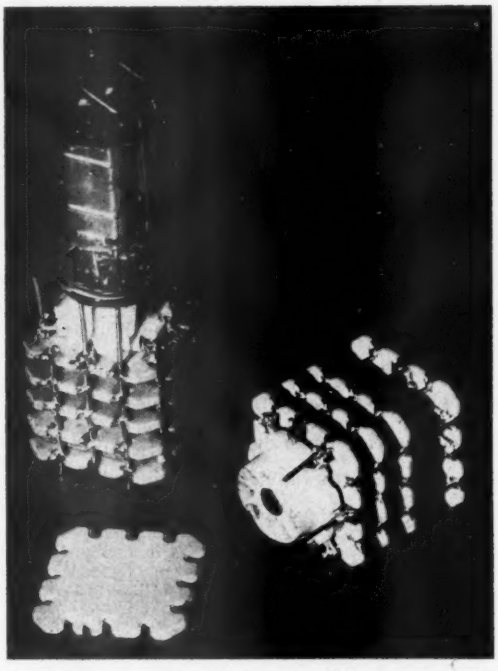
AN AUTOMATIC PRODUCTION LINE for the manufacture of electronic products and a unique system of electronics design have been developed by the National Bureau of Standards. The program, code-named PROJECT TINKERTOY, was sponsored by the Navy's Bureau of Aeronautics.

Starting from raw or semi-processed materials, machines automatically manufacture ceramic materials and adhesive carbon resistors, print conducting circuits, and mount resistors, capacitors, and other miniaturized component parts on standard uniform steatite wafers. These wafers—7/8" square x 1/16" thick—are stacked very much like building blocks to form a module that performs all of the functions of one or more electronic stages.

Modules are mechanically standardized and uniform, facilitating their accurate handling through automatic machines. Each module, in general, consists of 4 to 6 thin ceramic wafers bearing various circuits. Various modules are combined with one another and with other standard components to form major functional electronic sub-assemblies.

The use of fully mechanized and automatic equipment, and 100% automatic physical and electrical inspection provided for in the production line, eliminates a vast amount of handwork ordinarily required to manufacture and maintain complex electronic equipment.

A pilot plant utilizing these machines is now in operation. It covers 15,000 square feet of floor space, and requires only 35 workers. The 300-foot assembly line is designed for production of 1,000 modules per hour. Currently producing modules for sonobuoys (used in aerial anti-submarine warfare), the system is so flexible that it can be switched over in a few minutes to the production of simple radio sub-assemblies.



The wafer, the module, and the module-mounted tube. Each module is made up of four to six wafers bearing printed conducting circuits, tape resistors, capacitors, tube sockets, and other miniaturized electronic component parts.

Each standard wafer is pressed with 12 peripheral notches, three to each side, plus an additional keying notch. In the final module assembly, riser wires are mechanically soldered into the 12 notches and serve as physical supports for the unit. The keying notch permits individual wafers to be automatically oriented throughout the various production stages.

Project Tinkertoy makes possible a rapid conversion from civilian to military products, and back again, on short notice and at the same time allows a greatly expanded production capacity.

The high speed wafer pattern printer. Wafers issued from vibratory hoppers pass under a stencil screen that transfers the circuit pattern to the wafer by a silver paint. Robert L. Henry, NBS project leader is indicating the special mounting for the stencil screen.

. . . Month's Talk, from page 70

tric energy is adaptable to constant or variable speed control with some simple controls; hydraulics can furnish a lot of power in compact areas and have speed variation; energy by air cylinders is fast and quite inexpensive, but more difficult to control when speed variation is required. Mechanical mechanisms can produce speed variation, but simplifies synchronization when it must be positive and accurate.

Limit switches, tripping mechanisms, or escapement movements should be selected or designed to stand up under the service they must render. Those which are safety items and operate only in an emergency must be positive, even though seldom operating. Those which operate for every piece must have exceptional wearing qualities. Where shock is involved, provide independent members to absorb the shock and keep them out of the limit mechanism.

One of the most important features is to design the simplest combination of mechanisms and controls possible. Very often we do it the hard way first. If a simple electric controller or limit switch will do it, don't insist on electronics. If the movement can be accomplished by a simple lever arm mechanism, don't use hydraulic, air, or electric energy. Remember, each additional moving part, in any equipment, adds cost, maintenance, and service.

When developing or selecting limit mechanisms, or escapement movements, always allow a reasonable dimensional movement. By this I mean, use one inch instead of one-eighth of an inch, or, if items are large and bulky, allow six or ten inches. These figures mentioned are not definite, or intended to be a perfect guide, but are intended to illustrate relative proportions.

Reasons for the longer movements are: you eliminate precision building, which will make them much less expensive; the longer movement allows for wear, and will result in continuous, uninterrupted production, reduce repairs and down-time; it will also compensate for vibration and insure perfect operation; it will make adjustments much simpler and eliminate micrometer adjustments.

After a mechanism has been laid out and developed, scan it

. . . Continued on page 75

SPEED CASE MAKES AMES A STEEL PLATE HARDNESS TESTER BETTER INSTRUMENT

A Model 4 Ames Portable Hardness Tester manufactured by Ames Precision Machine Works, Waltham, Mass. is shown above. The dial is direct reading, indicating Rockwell A, B or C scale hardness on thicknesses up to 4".

Frame of the Ames Model 4, and several other models, is machined from **Speed Case** (X1515) low carbon, open hearth steel plate, supplied in flame cut blanks, as shown at right. The machined frame is shown in lower view, after magnifier retaining arm (1) and dial support (2) have been silver soldered to frame.

Speed Case has proved ideal for this application for three reasons: (1) Available flame cut to close tolerance. (2) Ease of machining, longer tool life, more readily polished and (3) Superior physical properties rendering it more suitable for a precision instrument.

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CIRCLE INFORM-A-GRAM KEY NO. 73

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CIRCLE INFORM-A-GRAM KEY NO. 74

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completely for correct proportions, and do not let the proportions offend the eye. This is a desirable approach and, if followed consistently, will result in more successful "first attempts," regardless of what you are designing.

By this we mean do not use a small pin or shaft — say, one-quarter of an inch—to rotate or mount a five or six inch disc, even though the slide rule and technical data indicate a high safety factor. If space is available, make it an inch or so. Heat treated, high strength materials will not always eliminate failures as surely as sturdy construction will. Whenever you eliminate deflection in any mechanism, you eliminate failure by fatigue. For rotating parts on plain bearings, provide ample sizes and keep bearing pressures low. Always use a good proportion of length to diameter to eliminate wobble, or to support cantilever actions and maintain proper alignment.

In some applications of automation, electronic equipment may be the only type that will produce the action or results desired, and should be used. Electronic equipment is subject to proper mounting and application, the same as other mechanical or electrical items. Do not mount them where they may be subjected to excessive vibration, or to severe atmospheric conditions, due to the fact that there are many plants that do not have men in the electrical maintenance departments who are completely versed on servicing electronic equipment. Also, to follow a good practice of building any equipment, keep it as simple as possible, and use them when they are best suited for the application.

In summarizing, I believe the following statements are apparent, and can be of considerable assistance in working out many applications of automation:

1. Small plants, as well as large plants, can benefit by automation.

2. A variety of items, through the same process in job shop lots, lend themselves to automation benefits.

3. Select the conveyor which adapts itself to the manipulation movements required, and don't try to make one type conveyor do all operations.

. . . *Continued on page 76*

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CIRCLE INFORM-A-GRAM KEY NO. 76

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4. Design for sturdy construction to eliminate vibration, excessive wear for better alignment and positioning.

5. Do not crowd into too small a space, or try to make movement too abrupt.

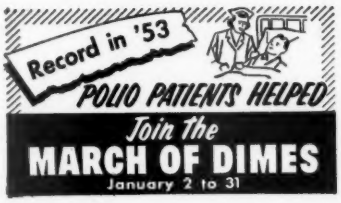
6. Limits, escapements, etc., should be protected from shock and, when possible, should allow for over-travel.

7. Have movements ample to eliminate micrometer adjustments which will result in lower first cost of equipment, and give longer life.

8. Select most suitable type power or energy to perform manipulation necessary, and select simple controls to reduce cost and maintenance.

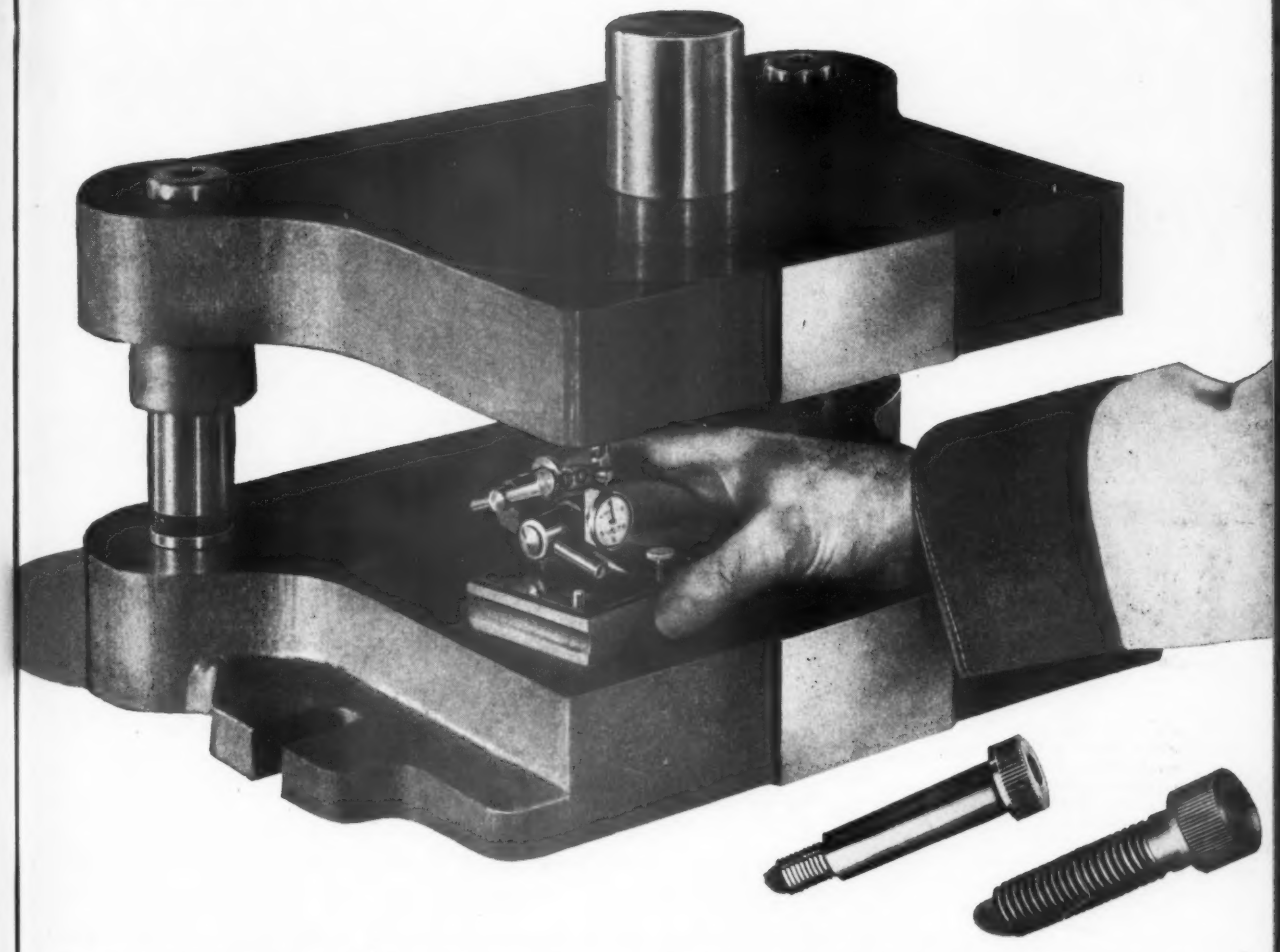
9. If first appropriations are not enough, go to management for additional funds to permit ample design for successful operation.

10. Approach automation with an open mind. Rearrange sequence of operations, if necessary. Provide new fixtures or change old fixtures to simplify manipulation or positioning of parts.



11. Automation is a mechanical cycle of movements, which duplicate each other and insure steady, peak production, and reduces scrap, rejects, rework and touch-up. It will produce uniform quality. It results in safety advantages, reduces inventory in process, and relieves congestion of aisles and floor space. It reduces damage to product between operations, reduces fatigue of operators. Many items of automation equipment can be charged off as expendable tools.

12. Automation produces steady, peak production and reduces cost, both of which are of paramount importance to our economy, with lower cost commodities within reach of many more people, resulting in greater consumption, which requires increased production and further expansion of facilities and equipment.



DIEMAKERS DEPEND ON DANLY FOR DIE SET ACCURACY

When it comes to meeting the precision requirements of the finest die work, diemakers everywhere *depend on Danly* Die Sets and Danly Diemakers' Supplies for accuracy. Precision machining, grinding, lapping and honing provide smooth, long-wearing surfaces with dimensional accuracy held within extremely close tolerances. On every component part, rigid inspection standards guard Danly quality.

Danly accuracy saves countless hours in the die shop, makes tooling-up much faster, insures longer production runs at lower cost. Why not bring Danly into your diemaking plans and get the results you're looking for. Remember, there's a Danly Branch near you. They're stocked for immediate delivery.

Call Your Local Danly Branch Today!

*CHICAGO 50—2100 S. Laramie Ave.
*CLEVELAND 14—1550 East 33rd St.
*DAYTON 7—3196 Delphos Ave.
*DETROIT 16—1549 Temple Ave.
*GRAND RAPIDS 113 Michigan St., N.W.
INDIANAPOLIS 4—5 West 10th St.
*LONG ISLAND CITY—47-28 37th St.
*LOS ANGELES 54—Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2—111 E. Wisconsin Ave.
*PHILADELPHIA 40 511 W. Courtland St.
*ROCHESTER 6—33 Rutter St.

*Indicates complete stock

CIRCLE INFORM-A-GRAM KEY NO. 77

Combine WESSON TOOL ENGINEERING SKILL and EXPERIE

Our 30th Year In Carbide!

This New WESSON Engineere TOOL HOLDER

ROUGH TURNS HOT FORGED 155 MM SHEL

The rugged strength and durability of the Wesson Holder is obvious in above picture. Chip wear is on the replaceable band.

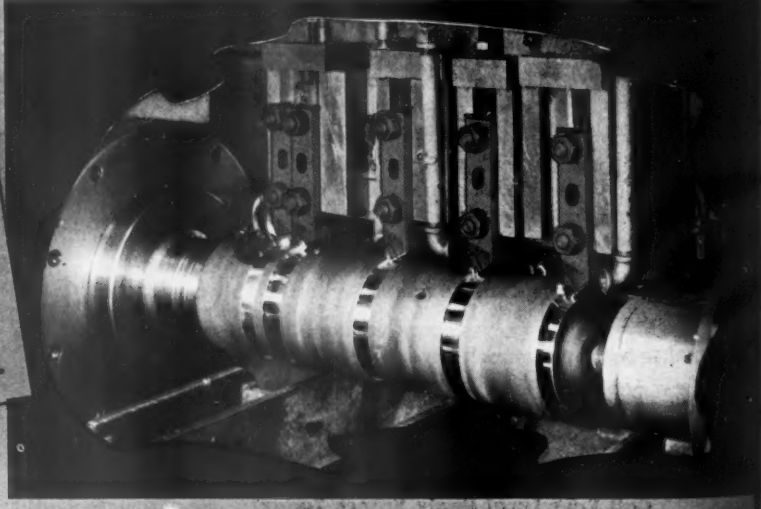
STYLES PAR-B and PAL-B

WESSON MULTICUT PARALLELOGR BAND TYPE HOLDER

WESSON BAND TYPE HOLDERS ARE VIRTUALLY INDESTRUCTIBLE E UNDER ABNORMAL CONDITIONS. THE STEEL BAND IS REPLACEABLE AT Y LOW COST. 101 DIFFERENT STANDARD STYLES AND SIZES ARE AVAILA

ACTUAL JOB SETUP NOW AT A LARGE SHELL MANUFACTURING CO.

Part.....155 MM hot forged shell.
Operation.....Rough turning.
Machine..Burleigh Stocker Hydra-Feed automatic lathe.
Tools.....5 Wesson Multicut Band Type Parallelogram Tool Holders with Parallelogram Wesson-metal insert grade WM.
Depth of cut.....Up to 1" maximum.
Feed.....032 per revolution.
S.F.M.....320.



The Wesson Tool Engineer in your area has full details on this job. Ask him about Case History #135.

This photo, taken while the machine was running shows the depth of cut and type of finish obtained by rough turning with Wesson Holders and Wesson-metal insert. Note extra holder strength possible with the parallelogram insert. The lead angle is 25°.

WESSON COMPANY

1220 WOODWARD HEIGHTS BLVD. FERNDALE (DETROIT 20), MICH.

WESSONMETAL HIGH PERFORMANCE *for Increased Production . . .*

. . . . And *This*

WESSONMETAL INSERT

WITH CUTS UP TO 1" DEEP!

Another FIRST for WESSON

with Tool Costs Reduced by Over 60%
Production Increased 400%

OLD METHOD	NEW WESSON METHOD
Tool Cost.....$37.50	Tool Cost.....$50.00
Useable Carbide.....3/16"	Useable Carbide.....1/16"
Average Pieces per Grind...60	Average Pieces per Grind...60
Pieces Machined per Tool..420	Pieces Machined per Tool..1680
Tool Cost per Piece.....8.1c	Tool Cost per Piece.....2.9c
Down Time for Tool Change... 15 min. every hour	Down Time for Tool Change... 4 min. every hour

The Wessonmetal parallelogram type insert is designed for strength and durability.

½" x 1" x 1½" either solid or with brazed steel slug on bottom for back up screw contact.

WESSONMETAL IS OUTSTANDING FOR HIGH PERFORMANCE BECAUSE IT IS UNIFORMLY DEPENDABLE IN QUALITY

WESSONMETAL is available in 8 grades for all types of metal working.

SEE THE DRAMATIC STORY OF CARBIDE in Sound and Color "THIS CARBIDE AGE"

There's a Wesson Tool Engineer in your area who will give you full details about this fine educational movie. Call him or write.

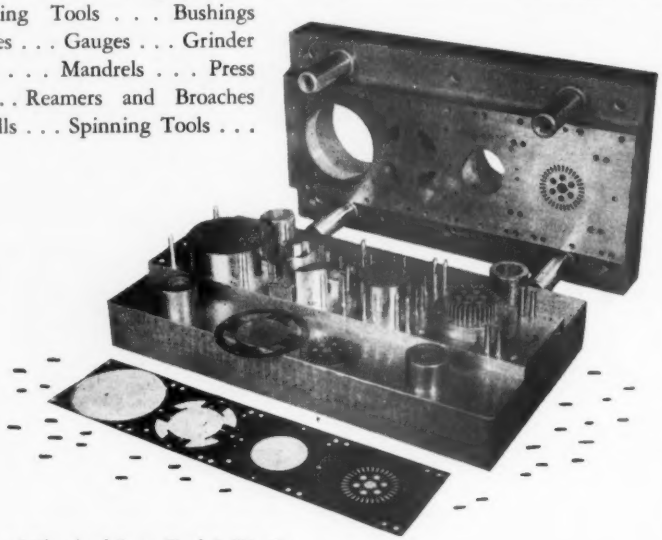
WESSON METAL CORPORATION

LEXINGTON 34, KENTUCKY

Darwin •NEOR•

for Quantity Production

"NEOR" is the original—and still finest—Oil Hardening, Non-Deforming High-Carbon, High-Chrome Tool Steel. Hardened "NEOR" withstands 240,000 p.s.i. and has not been tested to destruction. Correctly heat-treated, it will not deform or shrink. "NEOR's" high resistance to abrasion make it *first choice* for production in high quantities. Call on your Darwin sales engineer for cost-saving results with "NEOR" on: Brass Finishing and Burnishing Tools . . . Bushings . . . Dies . . . Gauges . . . Grinder Centers . . . Mandrels . . . Press Tools . . . Reamers and Broaches . . . Rolls . . . Spinning Tools . . . Taps.



Courtesy of Cleveland Form Tool & Die Co.

PRACTICAL RESULTS FROM "NEOR" USERS

Lamination or Notching Dies New York firm blanking one quarter hard cold rolled chrome strip (1.25% C, 2% Cr.), 0.015" thick reports increases per grind . . . "NEOR": 60,000—127,000; High Speed Steel: 30,000; Carbon Steel: 7,000.

Coining Press Dies Detroit automobile manufacturer coin pressed 205,000 in first grind—16,000 with other dies.

Drawing Dies Chicago manufacturer of automotive devices produced 20,000 per grind—previous best 400 to 800 (half hour run). Operation was drawing cold rolled strip steel (0.40-0.50 C) and .109" and 0.083" thick.

Trimming Dies Philadelphia concern trimming semi-hot steel balls found "NEOR" die operated 25 hours—previous best 4 hours.

Slitting Cutters Chicago can manufacturer ran "NEOR" cutters 7 days without regrind—others lasted 1 day.

Complete line of highest grade Tool Steels, including PRK33, MINEOR, OHT, "MT6" and various grades of Hot Work Specialty Steels. Furnished in bar stock, billet and sand casting. Drill rod, flat ground rod and tool bits.

Bulletin on Request.

DARWIN & MILNER Inc.

highest grade tool steels

2345 ST. CLAIR AVENUE ★ CLEVELAND 14, OHIO

REPRESENTED BY

ZIV STEEL & WIRE CO., CHICAGO • DETROIT • ST. LOUIS • INDIANAPOLIS • TOLEDO • MILWAUKEE • M. G. OPP COMPANY, NEW YORK CITY • PECK STEEL & DIE SUPPLY COMPANY, LOS ANGELES • CHARLES B. WEBSTER, PLAINVILLE, CONNECTICUT • CHARLES W. BRINGMAN, ORLANDO, FLORIDA

CIRCLE INFORM-A-GRAM KEY NO. 80

Gear Cutting Methods

Design factors often result in some pretty strange looking gears and it's up to the tool engineer to figure out how they may be cut, Richard S. Hildreth, field engineer, Michigan Tool Company, recently told the Peoria, Illinois, chapter of the American Society of Tool Engineers. What the production man needs to know are the various gear cutting methods available to him to get the job done and the advantages as well as the limitations of each.

Three preferred methods are available to cut external spur and helical gears:

1. By hobbing (a generating method).
2. By shaping (also a generating method).
3. By shaping by the form tooth method.

Although hobbing machines are well known in all gear cutting establishments, Hildreth told his listeners, a recent development in the field is a high speed hobbing machine that can spin the spindle at 1000 rpm. This speed is brought about by the realization that high speed steel hob life is surprisingly good at higher rates of surface speed.

To get the required accuracy out of a hobbing machine, it must be maintained in excellent repair, the gear blank must be accurate and the material being cut should be consistent metallurgically.

The generating shaping method is extremely versatile, the speaker explained, since it lends itself to a variety of gears and forms. It is inherently a slower process than hobbing but can be used on innumerable gears that do not lend themselves to hobbing, such as gears with close adjacent shoulders and internal gears.

The third method of shaping gears is by the form tooth method, or, as it is better known, the Shear-Speed method. This high speed, high production technique can best be described by comparison with a modern high speed internal broaching machine, the speaker said. The Shear-Speed differs from other gear cutting methods since it operates on all the teeth simultaneously. For each space in the

gear, a separate tool or blade is required. The cutting section of the tool is a counterpart of the gear space. All blades are identical to each other when shaping gears. Types of gears within the work range of the machine are: External spurs, external helicals of low helix angle, internal spur gears, ratchets, splines, cam lobes, interrupted tooth forms and sprockets.

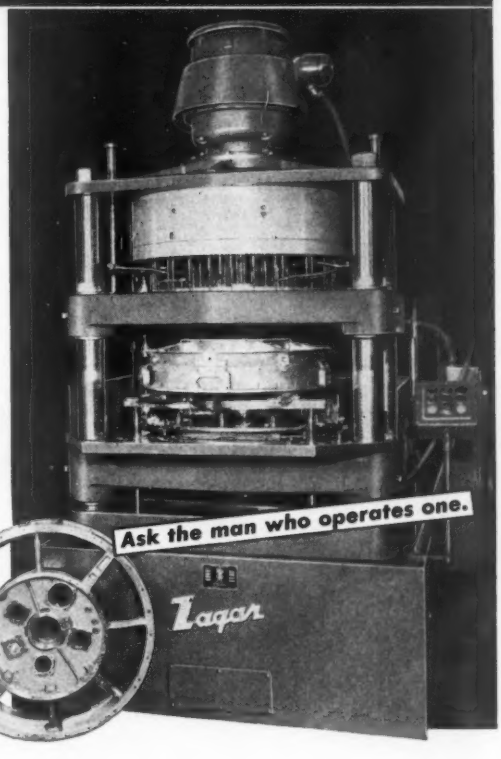
Once the various gears are shaped by the several available methods, most modern gears with the requirement of a high degree of accuracy are finished by shaving. This process results in highly finished tooth surfaces, improved spacing and tooth form. All these factors contribute to the performance of a gear in a transmission.

Although shaving will correct a gear and improve it within limitations, it is not a "cure-all" for spacing, form and runout errors, the speaker warned his audience. Shaving tool life between sharpenings may be short if there are too many errors to correct. Use of unqualified operators is also an obstacle to attaining the maximum in shaving efficiency at the lowest finishing cost.

Due to modern methods of manufacturing, prejudices against one gear shaping method or another are being eliminated, Hildreth noted. This results from the efforts of the various manufacturers in improving their product and educating themselves and their customers.

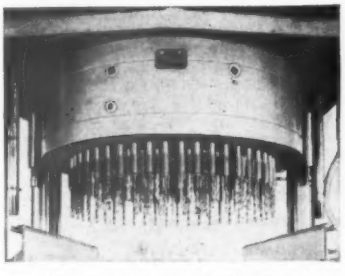
Packard, Too, Uses Zagar
ENGINEERED DRILLING
IN STANDARD ZAGAR DRILLING MACHINES

Zagar's Exclusive, Rigid 4-Post Construction Permits Hundreds of Holes to Be Drilled in RECORD TIME!



Zagar engineering brought down the time of drilling this part from three hours to seven minutes.

This jet engine part suggests the almost unlimited possibilities in drilling hundreds of holes at one pass. Zagar 4-post machines are built around interchangeable gearless drillheads. Any number of holes on all centers can be drilled as close as twice drill diameter in any material. Zagar's 4-post machines achieve heavy duty, multiple-spindle, close center drilling. . . with greater horsepower and thrust, with better alignment and accuracy, with less breakage of *small drills*. . . Let our engineers calculate your savings by demonstrating the Zagar method.



Zagar Interchangeable Drillhead.

★ ★ ★

Write For Catalog T-11

ZAGAR TOOL, INC. 24000 LAKELAND BLVD. CLEVELAND 23, OHIO

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY ZAGAR TOOL, INC. 24000 LAKELAND BLVD. CLEVELAND 23, OHIO

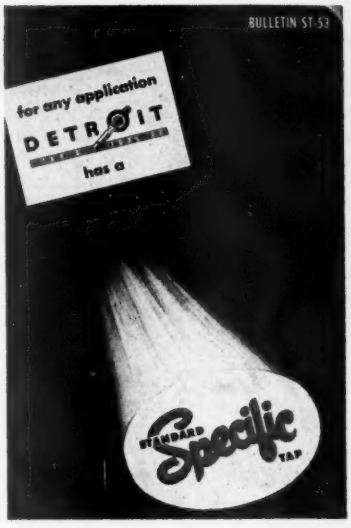
CIRCLE INFORM-A-GRAM KEY NO. 81

For Ease and Convenience Use TOOLING and PRODUCTION Inform-A-Gram Cards

Cutting Tools That Simplify Production. How you can eliminate separate drilling, finishing and deburring operations is the theme of a brochure now available from the Spiral Step Tool Co., 5400 N. Damen Ave., Chicago 25, Ill. Besides describing their line of step drills, Spiral also includes information on some of their other cutting tools such as counterbores, special reamers end mills and backoff form cutters.
Circle Inform-A-Gram No. B1.

Conveyor Trolley Wheel Lubricator. How to automatically lubricate entire conveyor lines — trolley wheels, chains, drives, carriers and rollers—without stopping the line, thus eliminating shutdowns for lubrication, work spoilage and safety hazards is illustrated in a new catalog sheet distributed by the Alemite division of Stewart-Warner Corp., 1826 Diversey Parkway, Chicago 14, Ill.
Circle Inform-A-Gram No. B2.

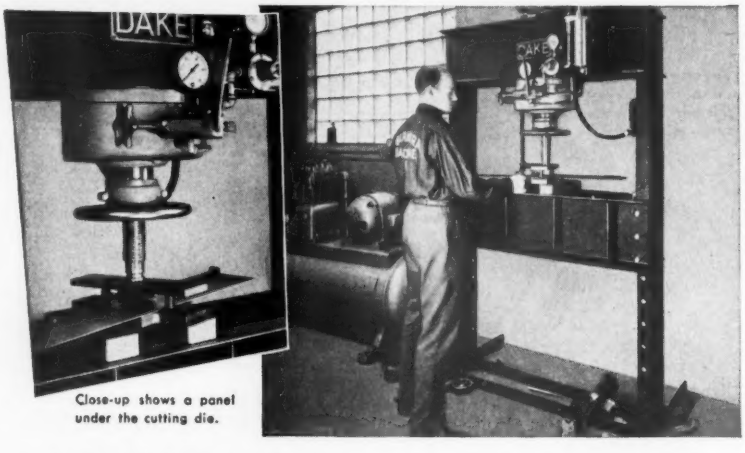
Taps For Any Application. This booklet presents an idea of the specific taps offered by the Detroit Tap & Tool Co., 8615 E. 8 Mile Rd., Base-



line, Mich. In it you will find informative data and specifications on taps for steel and tough materals, cast iron, aluminum, zinc die cast metals, brass and plastic and bakelite.
Circle Inform-A-Gram No. B3.

Used his head, a $100 die, and a DAKE Hydraulic Press

to reduce cost of cutting job from 88¢ to 9¢ a panel



Close-up shows a panel under the cutting die.

Jerry Denicola of the Marmora Machine Co., Chicago, believes in using his head to make money. The ways in which he uses his Dake Press should be an inspiration to other machinists.

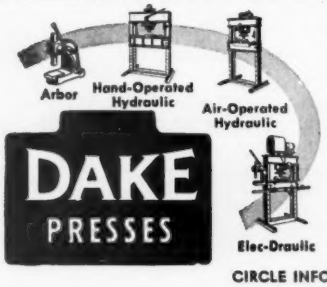
One of his customers makes flame-cutting machines, for which Jerry furnishes steel panels in which an opening must be cut exactly to 1¾" x 2¾" size.

This job was formerly end-milled, and the corners filed square—a job that required a skilled mechanic. Fifty panels cut this way required 7½ hours labor at $2.35 an hour, $17.62 for the run, or 88¢ a panel.

So Jerry made a hardened die at a cost of about $100, and put the job on his Dake Press. Now a run of 50 panels can be cut in 3 hours by a semiskilled mechanic at a cost of $1.50 an hour—$4.50 for the run, or only 9¢ a panel. So every time an order for fifty more panels recurs, there's an extra profit of $13.12 in it!

You, too, can make an extra profit with a Dake Press . . . see your Dake distributor.

Dake Engine Company, 634 Seventh St., Grand Haven, Mich.



Send for Big New Catalog

DAKE ENGINE COMPANY
634 Seventh St., Grand Haven, Mich.
Please send me a copy of Dake Catalog No. 129
Name _____
Company _____
Address _____
City _____ Zone ____ State ____

CIRCLE INFORM-A-GRAM KEY NO. 82

Dust Collectors. The complete line of Torit dust collectors is described in detail in a new 16-page catalog just issued by the Torit Mfg. Co., 317 Walnut St., St. Paul 2, Minn. Included in the catalog are cabinet and cyclone type dust collectors. Also, numerous illustrations show the adaptability of Torit products to meet specific industrial dust collecting problems. An added feature is a series of sketches and specification charts giving over-all dimensions.
Circle Inform-A-Gram No. B4.

Gages. A new illustrated 4-page bulletin giving complete specifications on a line of dial gages, cylinder bore gages comparitor and bench gages, all imported from England, is available upon request to DeWitt Equipment Co., 136 Lafayette St., New York 13, New York.
Circle Inform-A-Gram No. B5.

Hydraulic Drill Unit. "Air-Powered Hydraulic Drill Unit" is the title of this catalog offered by the Delta Power Tool Div. of the Rockwell Mfg. Co., 622D N. Lexington Ave., Pittsburgh 8, Pa. The booklet has extensive engineering data on Delta units, plus charts and an aid to operation analysis.
Circle Inform-A-Gram No. B6.

PREVIEWS

Circle postage-free Inform-A-Gram Key Number for your request

TOOLING and PRODUCTION'S Inform-A-Gram Section is a CARDload of Information

Double Circle Tools. The complete line of double circle tools, manufactured by Chicago-Latrobe, 411 W. Ontario St., Chicago 10, Ill., is displayed in detail in the firm's newly released attractive and comprehensive Catalog 51. The booklet

is indexed and contains 150 pages, designed for quick reference with a useful technical data section. Specifications and engineering information included. Among the tools featured are twist drills, reamers, countersinks, counterbores, carbide tools, tool bits and special tools.
Circle Inform-A-Gram No. B7.

Power Tool Benches. Morrison Products, Inc., 16816 Waterloo Rd., Cleveland 10, Ohio, announces a new line of benches for power tools. They are produced in two sizes which cover the complete range of sizes required for mounting standard lines of small power tools used. A 4-page brochure, describing the many features of the stands, is available from Morrison Products.
Circle Inform-A-Gram No. B8.

Milling Machines. Two types of vertical milling machines and one plain milling machine are described in three folders now available from the Index Machine Co., 541 Mechanic Street, Jackson, Mich. Bulletin 40 describes Vertical Milling Machine No. 40 and how it is used for accurate boring and locating. Bulletin 55 tells about the large capacity and versatile Model 55 improved Index vertical milling machine. Bulletin 60 relates the advantages of the Model 60 plain milling machine. Specifications of the respective machines are contained in each folder.
Circle Inform-A-Gram No. B9.

Ultrasonic Metroscope. A new bulletin (1010) on the new Model MS-101 Ultrasonic Metroscope for measuring wall thicknesses of metal and for locating internal defects has just been released by the J. W. Dice Co., 1 Engle St., Englewood, N. J. The folder gives specifications of the Metroscope, principles of operations, typical uses and other informative data.
Circle Inform-A-Gram No. B10.

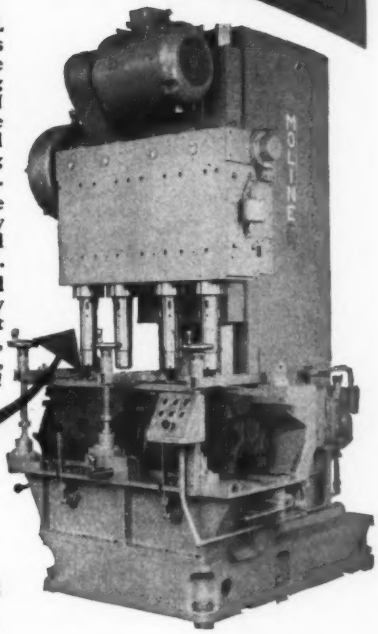
Thermocouples & Pyrometer Accessories. The Bristol Co., Waterbury 20, Conn., presents in their Bulletin P1238 a complete line of Thermocouples and Pyrometer accessories in a wide selection of interchangeable sizes and forms to fit all standard installations. Also included is a section of technical data to guide the user in the correct choice of equipment.
Circle Inform-A-Gram No. B11.

Another Big Manufacturer came to LEHMANN for Precision Boring Tools!

The MOLINE TOOL COMPANY in Illinois was given an order for a four spindle hydraulic rail feed cylinder boring machine. They came to LEHMANN for the necessary boring tools. The arrow points to the boring bars and cutters which LEHMANN Boring Tool built for MOLINE.

More efficiency and accuracy can be put into YOUR boring operations by the engineering staff and skilled machinists at LEHMANN.

Boring Tools especially designed and engineered for your needs by LEHMANN can help cut machining time to a minimum, give you precision accuracy, save you money!



Depend on LEHMANN:

- for top experience — 35 years approved by industry
- to put accuracy, utility and economy in your boring operations
- to stop costly errors in tool setting

Photo Courtesy Moline Tool Co.

LEHMANN BORING TOOL
4389 DUNCAN AVE. • ST. LOUIS 10, MO.

Tell us your boring problems without obligation—or—write today for CATALOG BT-12.

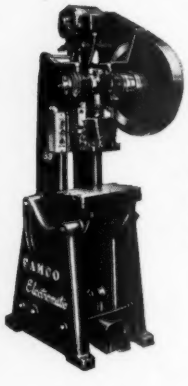
DIVISION NOVO ENGINE CO.

CIRCLE INFORM-A-GRAM KEY NO. 83

Permanent Magnets. Latest information on the use, design, properties and manufacture of Alnico permanent magnets, cast grade 7, is available in a 4-page technical report, PM-112, issued by the Carboloy Dept. of the General Electric Co., 11109 E. 8 Mile Rd., Detroit 32, Mich. In addition to graphs and tables explaining magnetic and physical characteristics of the magnets, the report includes a detailed discussion of design considerations, test information and a general comparison of cast grade 7 with other magnetic materials.
Circle Inform-A-Gram No. B12.

Machine Selection Charts. One of the features of the new comprehensive catalog released by the Kearney & Trecker Corp., 6748 W. National Ave., Milwaukee 14, Wis., is a helpful machine tool selection chart and details on how to use the firm's customer engineering or educational services. Also included in the 64-page catalog is a list of Kearney and Trecker precision and production machine tools and accessories such as the knee-type, plain, universal and vertical milling machines, plus a background on some of the people who make up the company.
Circle Inform-A-Gram No. B13.

famco
OPEN BACK INCLINABLE
POWER PRESSES



15 bench and floor models 3 to 18 tons capacity. Left: Model 59 Electromatic 18 Ton Press with exclusive Solenoid operated clutch.

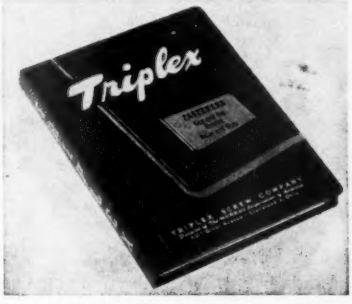
In an unusually short time Famco has become the nation's leading manufacturer of small O.B.I. presses. In addition to offering the largest line of precision-built presses on the market, Famco recently introduced the revolutionary Electromatic Clutch. This feature, built into its 13 and 18 Ton models, utilizes the instant action and increased efficiency of an electrically operated 9-point jaw clutch. Every care has been taken to make this the most rugged, highest quality line available. For complete details see your Famco Dealer or write for free Catalog.

FAMCO MACHINE COMPANY
3124 SHERIDAN RD. • KENOSHA, WIS.
AIR PRESSES • ARBOR PRESSES • BAND SAWS • DRILL PRESSES
FOOT PRESSES • POWER PRESSES • SQUARING SHEARS

CIRCLE INFORM-A-GRAM KEY NO. 84

Hole Punching Units. Just off the presses is the Wales-Strippit catalog illustrating and describing the company's new independent, self-contained Type H horizontal punching units. These new units are designed to punch holes in curved and straight flanges, rims and angles and similar shape work. Special designing makes it possible to punch holes in the sides of such work. For the catalog write to Wales-Strippit Corp., 345 Payne Ave., North Tonawanda, N. Y.
Circle Inform-A-Gram No. B14.

New Threaded Fastener Catalog. Triplex Threaded Fastener Catalog No. 530 is now available. Looseleaf and in handy size, the new indexed catalog contains 80 pages of weights and dimensions on a complete line



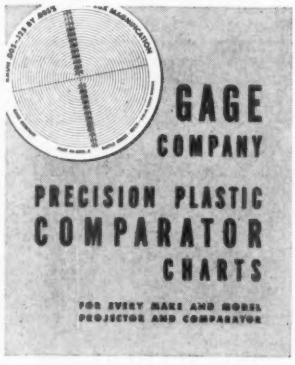
of nuts, bolts, screws, sems, washers, rivets and specials. It includes many diagrams and illustrations. Copies may be obtained by writing the Triplex Screw Co. Div., The Murray Corp. of America, 5317 Grant Ave., Cleveland 5, Ohio.
Circle Inform-A-Gram No. B15.

Tungsten Carbide Tools. A complete catalog on these precision machine ground-from-the-solid tools is yours for the asking from the Atrax Co., Newington 11, Conn. Among the tools described are burs, reamers, end mills and boring bits.
Circle Inform-A-Gram No. B16.

Checking Gages. The Indi-Ac Electronic Indicator is used to check a wide variety of standard and special gages. The manufacturers of this instrument, The Cleveland Instrument Co., 739 Carnegie Ave., Cleveland 15, Ohio, offer a booklet with complete details.
Circle Inform-A-Gram No. B17.

Carbide Tips. Just out is a 32-page, well-illustrated catalog containing data on all Carmet grades and on Carmet blanks, tools, die sections, punches and die inserts. Booklet should be necessary to those needing odd shapes and sizes of carbide. Write to Dept. TP-45, Allegheny Ludlum Steel Corp., Carmet Div., Wanda & Jarvis Aves., Detroit 20, Mich.
Circle Inform-A-Gram No. B18.

Optical Comparator Charts. This new 16-page catalog covers hundreds of standard precision plastic inspection charts for every make and



model of optical projector or comparator. Write to the Gage Co., Battle Creek, Mich., for your copy.
Circle Inform-A-Gram No. B19.

Sheet Steel & Plate Cutting Machines. The versatility of American Pullmax machines enable them to cut circles, straight edges or squares, irregular shapes, bead, fold, slot, dish and cut louvres. The American Pullmax Co., 2455 N. Sheffield Ave., Chicago 14, Ill., has available an illustrated folder giving sizes, specifications and other data.
Circle Inform-A-Gram No. B20.

Quadrill Turret Head. Reports are that this turret head made by the Chicago Quadrill Co., 1840 Busse, Des Plaines, Ill., will speed up drill press production 4 times in drilling, reaming, countersinking and counterboring. The turret head is a drill press attachment that will accommodate 4 drills or cutting tools. Complete information on the "Quadrill" and a similar 4-head attachment for taps is available in a new brochure just released by the Quadrill Co.
Circle Inform-A-Gram No. B21.

Punch Press Catalog. Kenco Mfg. Co., 5211 Telegraph Rd., Los Angeles 22, Calif., has just issued a 4-page illustrated brochure showing their 1953 line of 4 and 5-ton punch presses, swivel-base vises and rotary tables.
Circle Inform-A-Gram No. B22.

Floor Trucks. This literature, of handy "pocket" size yet large and substantial enough not to go astray in standard files, illustrates 32 different types of trucks for easier and safer materials handling. The specifications and descriptions of these trucks, available in numerous standard sizes, include pertinent product data plus how-to-use-it information. Write to the Nutting Truck Caster Co., Faribault, Minn., for your booklet.
Circle Inform-A-Gram No. B23.

Raker Set Saw Bands. This pictorial story tells you why Atlantic Raker Set Bands are so suitable for all operations requiring a tough true running band saw. Write to Atlantic Saw Mfg. Co., Inc., Brewery St., New Haven, Conn.
Circle Inform-A-Gram No. B24.

Diamond Dressers. The "Prestalloy" process assures greater diamond utility at the lowest possible production cost per dollar investment. A catalog on the diamond dressers is available from Diamond Products, Inc., Prospect Ave., Elyria, Ohio. **Inform-A-Gram No. B25.**

Wet Blasting. The American Wheelabrator & Equipment Corp., 852 Byrkit St., Mishawaka, Ind., is offering three bulletins on how to save hours with Liquamatte wet blasting. The catalogs tell how to save finishing time on tools and dies, glass molds and plastic molds.
Circle Inform-A-Gram No. B26.

Filters. A new general 8-page bulletin is now available on Delpark Filters from the Industrial Filtration Co., Dept. 299, Lebanon, Ind. Major features in this booklet are complete dimensions and capacities.
Circle Inform-A-Gram No. B27.

Demand DIECO

Your Biggest Value
in Stock-Size Die Sets
Prompt Delivery
All Sizes

DIECO Die Sets
1728 Combinations
All-Steel Semi-Steel
Special and Stock-Sizes

DIECO Guide Pins and Bushings
Precision, Commercial and Shoulder

DIECO Die Springs
500 Stock Sizes
3 pressures:
Medium, Medium-High and High

Performance is Proof!

Industry acclaims DIECO **finer precision craftsmanship:** "DIECO Die Sets are smoother operating—no prybars." ". . . mount dies easier, quicker." ". . . longer die-life." ". . . less down-time saves manhours." ". . . better production, bigger profits."

Demand DIECO for socket head screws and **all** your tool, die and machine shop accessories. **Send for your DIECO Catalog, now.**

The DIE SUPPLY Co.

CLEVELAND 9: 1400 Brookpark Rd. ★ SHadyside 1-9000 ★ TWX-CV-202
PITTSBURGH 6: 122 S. Sheridan Ave. ★ EMerson 1-0440
DAYTON 4: The Die Supply Sales Co., 311 Vermont Ave. ★ MI. 9691 ★ TWX-DY-85
BUFFALO 1: Die Supply Corporation. 234 Carolina St. ★ MAdison 1964
ST. LOUIS 13: Scott Special Tools, Inc., 1252 N. Kingshighway ★ FOrest 3454

DIECO

CIRCLE INFORM-A-GRAM KEY NO. 85

Precision Bending Machines. A new practical 32-page bending manual is available from O'Neil-Irwin, 315 8th Ave., Lake City, Minn. This instructive and authoritative booklet brings a volume of tested authentic bending methods applicable to any rotary type bender.
Circle Inform-A-Gram No. B28.

Pin Oilers. These are among the products manufactured by the Acro Metal Stamping Co., 338 E. Reservoir Ave., that are described in the firm's latest brochure. Information regarding sizes and dimensions is also presented on other Acro products.
Circle Inform-A-Gram No. B29.

Pressure-Blast Wet Blasting. Complete information on deburring, die and mold polishing, blending grind lines, scale removal, honing of cutting tools and pre-plating cleaning with both regular velocity and high velocity pressure blast wet-blasting equipment is now available in a new folder issued by the Cro-Plate Co., Inc., 747 Windsor St., Hartford 5, Conn. Sections of the book are devoted to automatic, high production rate machines, abrasives and "Metal-Guard," a new rust preventative to be used following wet blasting operations.
Circle Inform-A-Gram No. B30.

"better than 6 to 1 INCREASE IN PRODUCTION ON A VERY TOUGH JOB"

says
RAYMOND NEWSWANGER
Tooling Foreman of
NEW HOLLAND MACHINE CO.
Division of SPERRY CORP.

PIVOT HIGH SPEED STEEL PUNCHES
STRAIGHTGROUND • WHIPSLEEVED

★ Punching two 11/32 holes in the vertex of 3/16-inch hot rolled angle stock resulted in ordinary punches breaking at 1 to 1200 pieces — at New Holland Machine Co., New Holland, Pa.

Mr. Newswanger says:
"Since installing Pivot Punches (Series XS) we are getting runs of 7,500 pieces without breaking a single punch.

We have also experienced longer punch life on other die sets after installing Pivot Punches which we highly recommend."

★ Put Pivot Punch power, accuracy, longer punch life and higher production to work for you at lower costs. Write for FREE Catalog and standard prices. Write Dept. T.P.

tondra-treated FOR EXTREME HARDNESS
pivot punch and die corp.
NORTH TONAWANDA, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 86

Broach Bars and Fixtures. A brochure covering broach bars and fixtures has just been released by Cleveland Broach, Inc., 1061 E. 260th St., Cleveland, Ohio. The folder em-

phasizes the speed, lower production costs and savings obtainable through the use of modern broach bars and fixture tooling. It also points out the need for skill in engineering, designing and building of broach bars and fixtures to accomplish micro-precision accuracy.
Circle Inform-A-Gram No. B31.

Machine Tool Attachments. For lathes, turrets, or mills, the Master attachments can perform additional machining operations in the same setup. The Master Mfg. Co., 1309 E. Ave., Hutchinson, Kansas, is offering a new 24-page illustrated catalog describing how the attachments can be put to work grinding, milling, drilling, slotting and indexing.
Circle Inform-A-Gram No. B32.

Air Cylinders. Engineering data and mounting instructions are featured in a new brochure on air cylinders put out by the Miller Motor Co., 2040 N. Hawthorne Ave., Melrose Park, Ill., Miller air cylinders have solid steel heads, caps and mountings; hard chrome plated piston rods; dirt wiper seals and rustproof brass barrels, precision honed. They also meet J. I. C. Pneumatic Standards.
Circle Inform-A-Gram No. B33.

Hydraulic Cylinders. These high pressure cylinders feature the Miller square design for saving space. Besides meeting J. I. C. Hydraulic Standards, they start to move on 5 to 10 lbs. pressure and feed without chatter. Engineering and mounting data, plus specifications and dimensions are included in recently issued brochure available from the Miller Motor Co., 2040 N. Hawthorne Ave., Melrose Park, Ill.
Circle Inform-A-Gram No. B34.

Shock - Proof, Shake - Proof Pins. The all-around tension provided by spiral coils gives Spirol pins unique fastening properties. Radial spring action locks the pins in place and allows easy removal and reuse. Write to C. E. M. Company, 51 School St., Danielson, Conn., for illustrated folder and sample Spirol pins.
Circle Inform-A-Gram No. B35.

Precision Boring. Adjustable to 0.0002", the new, improved Mastur boring tools feature precision, speed and long service life. New body and block construction permits these tools to take heavier cuts at higher speeds. The Maxwell Co., 250 Broadway, Bedford, Ohio, is offering a catalog describing them.
Circle Inform-A-Gram No. B36.

Bending Press. The new Pines 20-ton hydraulic tube bending press and its cost-cutting production features are fully illustrated and described in a 4-page bulletin now available from the Pines Engineering Co., Inc., 601 Walnut Ave., Aurora, Ill. Dimensional views of both the front and side of the press plus a cross-sectional photo of the complete machine are included. The tube size range of this press is ½" through 2" O. D. maximum 2" x 0.083" steel tubing. The bending clearance is 2" tube with 5" center-line radius to 180°.
Circle Inform-A-Gram No. B37.

Precision Investment Castings. This booklet tells as well as illustrates the complete process of precision investment casting which involves reproducing intricate parts cast to close tolerances. This greatly reduces and many times completely eliminates subsequent machining. The booklet, showing the concrete aspects of this type of casting is almost equal to a visit to the Jelrus Precision Casting Corp., 136 W. 52nd St., New York 19, N. Y.
Circle Inform-A-Gram No. B38.

Leveling Jack. Literature is now available from the Enterprise Machine Parts Corp., 2735 Jerome Ave., Detroit 12, Mich., on their new improved machine leveling jack. It is reported that this jack is 50 per cent stronger, yet is lower in height.
Circle Inform-A-Gram No. B39.

Drill Press Feed. Hand-fed drill presses are turned into automatic drilling machines with the Bellows Drill Press Feed. The Bellows Co., Akron 9, Ohio is offering a 16-page booklet filled with facts on how to use the Drill Press Feed to the best advantage.
Circle Inform-A-Gram No. B40.

Silicone Rubber Products. A new 8-page buletin describing these items has just been issued. The silicone rubber products described are diaphragms, gaskets, sheet packings, oil seals, rings, insulation tape, rod and valve stem packings and molded shapes for many industrial uses. The heat-resistant and aging-resistance features of silicone rubber are pointed out and typical applications are explained. Copies of the booklet are available from the Garlock Packing Co., Palmyra, N. Y. Ask for Bulletin AD-147.
Circle Inform-A-Gram No. B41.

For Precision Between Centers
EX-CELL-O
CENTER LAPPING MACHINES
Meeting today's precision standards requires careful checking of every phase of the job, including the center holes in the work. Ex-Cell-O Center Lapping Machines correct inaccuracies of center holes that affect the quality of all subsequent operations performed between centers. These machines are precision built and are easy to operate. They are fully described in Bulletin 40271—a copy is yours for the asking.
EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN
EX-CELL-O
BEFORE LAPPING
AFTER
XLO
CIRCLE INFORM-A-GRAM KEY NO. 87

Hardfacing Alloys. A selector and comparison chart for hardfacing alloys is available from the American Manganese Steel Div., of the American Brake Shoe Co., Chicago Heights, Ill.

Circle Inform-A-Gram No. B42.

Tool Grinding. Two helpful booklets, "Maintenance of Alloy and High Speed Cutting Tools" and "Grinding Cemented Carbides," tell you many ways to improve tool maintenance costs. They are available from the Carborundum Co., Dept. TP 81-316A, Niagara Falls, N. Y.

Circle Inform-A-Gram No. B43.

Precision Contour Grinding. The Cleveland Grinding Machine Co., 1643 Eddy Rd., Cleveland 12, Ohio, has a catalog available (Bulletin T-10) on its "Visual Grind." This machine offers visual control of the workpiece at all stages.

Circle Inform-A-Gram No. B44.

Metal Stampings. This brochure describes in detail the technique recently developed and now used by Dayton Rogers for stamping in small lots and short runs. The booklet can be had by writing to the Dayton Rogers Mfg. Co., Minneapolis 7, Minn.

Circle Inform-A-Gram No. B45.

TODAY'S BEST BUY!

JOHNSON Model B

A full 5" x 10" capacity, low cost, handy saw for use in both small and large plants. Get details. Write today.

THERE IS A JOHNSON DEALER NEAR YOU

JOHNSON MANUFACTURING CORP.
ALBION, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 88

Precision Feeds. The Roll-Feeds Corp., Pawtucket, R. I., makes precision roll feeds for all types of presses. The feeds are accurate to thousandths, reverse instantly and maintain their original settings, regardless of use or wear. Roll-Feeds is offering a bulletin with illustrations and specifications on several models or roll feeds. Also included is a blue-print explanation on how non-slip feed is accomplished by simple wedge action.

Circle Inform-A-Gram No. B46.

Automatic Machinery. "Design and Build" a newly published 12-page booklet describes two new cost-cutting developments—the trend toward complete automatic manufacturing equipment and the combining of basic services in creating automatic machinery and special tooling for modern production lines. Copies of this bulletin can be obtained from Ace-Central States Machine Tool Co., 3801 Trenton St., Detroit 10, Mich.

Circle Inform-A-Gram No. B47.

Grinding Wheel Specifications. This is a wheel selection chart for use with Amsco hardfacing alloys. It gives data on high speed, low speed, cylindrical, surface and internal grinding of nickel manganese, mo-mang, co-mang, economy hardface and other Amsco metals. The chart is available from American Manganese Steel Div., of the American Brake Shoe Co., Chicago Heights, Ill.

Circle Inform-A-Gram No. B48.

Magnesium. This lightest of the commercial structural metals is now being rolled into plate in a new mill at Detroit. A folder titled, "Magnesium Plate and Sheet to Reduce Weight," is available from Brooks and Perkins, Inc., 1980 W. Fort St., Detroit 16, Mich. Besides giving dimensions and tolerances, it devotes a full page to comparing gages required for equal stiffness in sheet magnesium, aluminum, brass and steel.

Circle Inform-A-Gram No. B49.

New Models—New Ideas. Whether in a visionary or concise state, new models or new ideas can be further conceived, designed, developed and built into finished machinery by the Service Machine Co., Inc., 162 Miller St., Elizabeth 4, N. J. Some of the first model machines SEMCO has built are a multi-folding machine, Ramie decorating machine and a special paper coating machine. Learn more about the Service Machine Co. by writing for their brochure, "Ready to Serve You."

Circle Inform-A-Gram No. B50.

Toggle Clamps. For complete information on the Caddy toggle clamps with double clamping pressure, extra large pins, all welded construction and heavier frame write to Erico Products, Inc., 2070 E. 61st Place, Cleveland 3, Ohio. Ask for Bulletin TC-6.
Circle Inform-A-Gram No. B51.

Phenolic Casting Resins. During the past 25 years, Marblette has developed the know-how and special equipment essential in providing the liquid phenolic resins necessary to meet specific requirements. They are offering a 98-page booklet on this phenolic casting. Write to Marblette 37-19 30th St., Long Island City 1, N. Y.
Circle Inform-A-Gram No. B52.

Coolant Coolers. The latest bulletin (No. 502) of the Frostrode Division of Viking Products, 3066 E. Outer Dr., Detroit 24, Mich., shows the advantages that can be obtained by using Frostrode Coolant Coolers when applied to machining operations. Higher operating speeds, longer tool life and better surface finish are some of the features discussed in the booklet.
Circle Inform-A-Gram No. B53.

Spindle Repair Service. This is a step by step picture story of high speed grinding and precision boring spindle repair service. Included are descriptions of how they disassemble a damaged spindle, and of all the steps in reconditioning and reassembling the spindle. The booklet is available from Bearings, Inc., 364 Euclid Ave., Cleveland 15, Ohio.
Circle Inform-A-Gram No. B54.

Production Boosters. Literature on 5 production boosters for cutting costs is being offered by Ideal Industries, Inc., Sycamore, Ill. Booklets are available on live centers for deep cuts and high turning speeds; demagnetizers for tools, punches, dies and drills; electric etchers for burning a smooth, permanent mark into iron, steel or their alloys; "cush'n-blo" hammers for preventing surface damage to work; and electric tachometers.
Circle Inform-A-Gram No. B55.

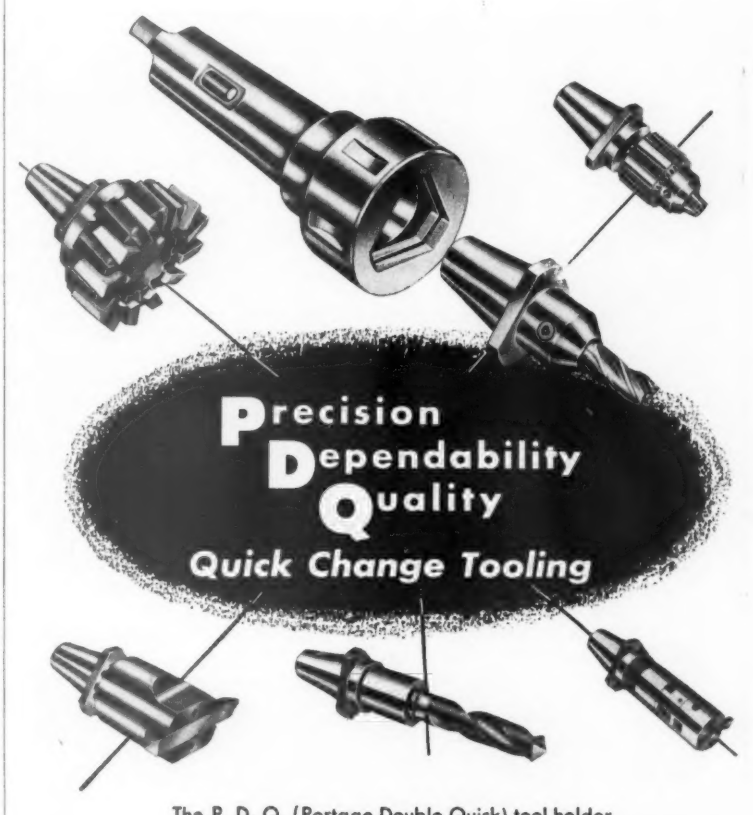
Die Casting Machine. The Lake Erie 400-ton model die casting machine has a cold chamber injection system for aluminum, magnesium and brass plus several other exclusive features. Bulletin 23.1, available from the Lake Erie Engineering Corp., 620 Woodward Ave., Buffalo 17, N. Y., describes in some detail this die casting machine. Specifications are an added attraction in this brochure. Also explained is the plunger gooseneck die casting machine for zinc, lead and tin.
Circle Inform-A-Gram No. B56.

Press Room Equipment. Bulletin No. 80 on automatic press room equipment is now available from the U. S. Tool Co., Ampere (East Orange), N. J. This catalog contains illustrations and descriptions.
Circle Inform-A-Gram No. B57.

HSS Chatterless Countersink. Complete details, operating data and specifications on these countersinks, plus more than 300 other Ford rotary tools are contained in the firm's new Catalog No. 207. The address is the M. A. Ford Mfg. Co., Inc., Davenport 1, Iowa.
Circle Inform-A-Gram No. B58.

Shop Equipment. The Industrial Bench and Equipment Mfg. Co., 98 South St., New Britain, Conn., has issued a new 1953 catalog describing its steel shop equipment.
Circle Inform-A-Gram No. B59.

Band Saws. Famco band saws cut all shapes and types of metals. They are built to provide unobstructed view of cutting operations and easy access to the work. A catalog describing the saws is available from Famco Machine Co., 3124 Sheridan Rd., Kenosha, Wis.
Circle Inform-A-Gram No. B60.



The P. D. Q. (Portage Double Quick) tool holder and adapter line opens a new era in quick change tools. These Portage tools not only mean new speeds in production and set-up time, but increased accuracy as well.

Send for the New P. D. Q. Catalog

PDQ **PORTAGE Double-Quick TOOL CO.**

1046 Sweitzer Avenue • Akron 11, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 89

Powder Metallurgy Today. For a quick look at the opportunities that exist in the field of powder metals, the F. J. Stokes Co., 5500 Taber Rd., Philadelphia 20, Pa., offers a booklet called "Powder Metallurgy Today."
Circle Inform-A-Gram No. B61.

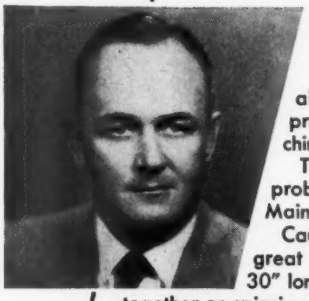
Brazing. The story of how furnace and induction brazing reduces costs, increases production and achieves higher quality is told in a picture-story, case-history technique in a new bulletin available from the General Electric Co., Schenectady 5, N. Y.
Circle Inform-A-Gram No. B62.

Quick-Detachable Hose Couplers. Information on the "Chrome Sleeve" Quick Detachable Couple is the subject of a bulletin available from the Foster Mfg. Co., 2850 Gravois, St. Louis 18, Mo.
Circle Inform-A-Gram No. B63.

Microtrip Control. Here is a means of electrical control for any manually operated power machine that is reported will result in a 10% to 25% gain in production with unprecedented safety to the operator. Complete details available in new bulletin put out by Micro Switch, Freeport, Ill.
Circle Inform-A-Gram No. B64.

he sets 'em up...

for speed and accuracy!



Erickson field engineers, like Dick Butts above, are trained to get the utmost in production and accuracy from your machine tools.

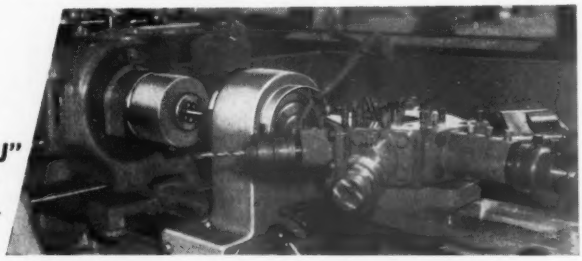
Typical is the solution to a "precision" problem at Saco-Lowell Shops of Biddeford, Maine . . . manufacturers of textile machinery. Cause of lost accuracy was an unusually great diameter-to-length ratio on rolls 24" to 30" long. They must fit perfectly when threaded together on spinning frames up to 52' long. Machining consists of drilling, reaming, and tapping to a .004" TIR from thread P.D. to roll O.D.

Accuracy is now rigidly held by use of Erickson Speed Chucks as both headstock and steady-rest. A report from Saco-Lowell states:

"By use of Erickson chucks on both spindle and auxiliary support, we increase quality, reduce handling time and reduce set-up time when changing to other sizes."

Erickson's technical staff can develop the correct solution to your tool and work holding problems.

Write for Catalog "J" Today



ERICKSON TOOL COMPANY

2314R **HAMILTON AVE.** • **CLEVELAND 14, OHIO**

COLLET CHUCKS . TAP CHUCKS . FLOATING HOLDERS
EXPANDING MANDRELS . AIR CHUCKS . SPEED INDEXERS

CIRCLE INFORM-A-GRAM KEY NO. 90

Precision Cutting Tools. Reamers, end Mills, special tools, counterbores, milling cutters and form relieved cutters that are made by the Falcon Tool Co., P. O. Box 4605 Mt. Elliott Station, Detroit 34, Mich., are adequately described and illustrated in the company's latest catalog. Recommended speeds and other specifications included.
Circle Inform-A-Gram No. B65.

Precision Cutting Tools. For precision boring, turning and facing operations, the DeVlieg Microbore Co., 480 Fair Ave., Ferndale 20, Mich., presents a multi-purpose single point adjustable tool with micrometer adjustment. Fast dependable adjustment to 0.0001 on diameter is available with this tool. Features of the multi-purpose tool, plus specifications and other data are contained in a brochure now offered by DeVlieg.
Circle Inform-A-Gram No. B66.

Hand Marking Machine. The Cadillac 115 Hand Marking Machine is ideal for many light marking operations and short run jobs. Its simple construction makes it easy to change from one marking operation to another. For full information write to Cadillac Stamp Co., 17303 Ryan Rd., Detroit 12, Mich. Ask for Bulletin L-115.
Circle Inform-A-Gram No. B67.

High-Slip Motors. A new 4-page bulletin, describing totally enclosed, fan-cooled, high-slip induction motors for punch press service, is being distributed by General Electric Co., Schenectady 5, N. Y. Cutaway drawings illustrate the ventilation and construction features of the motor.
Circle Inform-A-Gram No. B68.

Gear Shaving. A new 4-page two-color bulletin (No. S-53-7) describing the newly redesigned Model GCU Red Ring shaving machine is now available from the National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich. Illustrations and descriptive material show how a new differential upfeed mechanism provides greater flexibility on a shaving machine on which conventional and diagonal shaving operations as well as crowning and taper shaving can be performed.
Circle Inform-A-Gram No. B69.

Jigs and Fixtures. Featured in this booklet are 28 of the most commonly used fixture details, including 3 types of rest buttons, fixtures keys, swivel screws, dog point screws, hand knobs, crank handles and alloy steel stubs. Full scale dimensional drawings also are included. The bulletin can be obtained from the Harco Engineering Co., 12092 Woodbine Ave., Detroit 28, Mich.
Circle Inform-A-Gram No. B70.

Industrial Furnaces. Fuel fired high temperature furnaces for all types of heat treatment are made by the Gas Machinery Co., 16120 Waterloo Rd., Cleveland 10, Ohio. The firm has a brochure, now available, that illustrates and describes several types of roller hearth furnaces. Cross-sectional drawings of the heat treating units included.

Circle Inform-A-Gram No. B71.

"Hardsteel" Drill. With this tool, accurate and smooth drilling, countersinking, counterboring and reaming in steels hardened by any process can be done without first annealing the work. Write to the Black Drill Co., Inc., 1368 E. 222 St., Cleveland 17, Ohio, for a copy of the "Hardsteel" Operations Manual.

Circle Inform-A-Gram No. B72.

Hydraulic Presses. The job of knocking out forging die inserts formerly required two men and sometimes several hours of hand sledging. Now one man does it easily in a few minutes with a Dake 125-ton air-hydraulic press. A catalog is offered by the Dake Engine Co., 634 Seventh St., Grand Haven, Mich., explaining the presses in full.

Circle Inform-A-Gram No. B73.

Cherry Blind Rivets. These rivets that are installed by one man from one side of work are described in detail. The catalog includes information on applications, mechanical specifications, types, and data on the Cherry Blind Rivet Gun. Information available from the Townsend Co., Cherry Blind Rivet Div., Santa Ana, Calif.

Circle Inform-A-Gram No. B74.

"Wire-Wrap Connections." A wire-wrap connection, as discussed in this booklet, consists of wire wrapped around a terminal so tightly that without solder, it meets the exacting requirements of a permanent electrical and mechanical connection. A new tool for wire wrapping is now available and is fully described in literature available from the Wire-Wrap Division of the Keller Tool Co., Grand Haven, Mich.

Circle Inform-A-Gram No. B75.

Cleaning Metal Parts. The Detrex Corp., Box 501, Detroit 32, Mich., is offering a special technical folder on its new Soniclean Process, the application of ultrasonic energy for cleaning metal parts. Illustrated by appropriate graphs and diagrams, the folder describes in considerable detail the principles and methods used in the new Detrex process. The Soniclean process, the brochure says, can be applied to nonabsorbent materials such as metals, glassware and molded products.

Circle Inform-A-Gram No. B76.

For Precision Milling & Boring. This is a condensed catalog which describes the entire line of machines manufactured by the W. B. Knight Machinery Co., 3920 W. Pine Blvd., St. Louis 8, Mo. Included are construction features and specifications.

Circle Inform-A-Gram No. B77.

"Soft" Metal Deburring. Two standard Maizo blast machines for the production deburring of a variety of "soft" metal parts are described in Bulletin No. 103-57 issued by the Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 4, Mich.

Circle Inform-A-Gram No. B78.

Diamond Vulcanized Fibre. Three important sheet grades of Diamond Vulcanized Fibre, with available sheet sizes, thickness and colors, are described in a new 12-page catalog just issued by the Continental-Diamond Fibre Co., Newark, Del.

Circle Inform-A-Gram No. B79.

Beryllium Copper Tools. The advantages of beryllium copper tools as a safeguard against accidental fire or explosion caused by sparks are described in an illustrated folder just issued by the Beryllium Corp., Reading, Pa. The folder describes 31 types of Berylco safety tools.

Circle Inform-A-Gram No. B80.

Durable... Dependable
FIXTURE CLAMPS and FIXTURE DETAILS by Morton
IMMEDIATE DELIVERY
LARGEST ASSORTMENT IN THE INDUSTRY
BACKED BY 30 YEARS OF FINE TOOL MAKING
ECONOMIZE . . . USE THEM AS STANDARDS. All precision made of heat treated selected steel, cadmium plated and corrosion resistant MID-NITE BLACK FINISH (a special MORTON process). Individual parts or complete assemblies. Any MORTON product can be adapted to whatever changes you might specify.
MORTON
SWING CLAMP ASSEMBLY
DOUBLE CAM ASSEMBLED WITH EYE BOLT
CLAMP STRAP
FLAT WASHER
COIL SPRING
STEEL FINGER HANDLE
CLAMP REST
JAM NUT
Morton
MAIL TODAY
For our 72 page illustrated catalog. Contains full size tracing templates of each product, bound in loose leaf form for easy removal. SAVE TOOL AND DESIGN COSTS.
MORTON MACHINE WORKS
2421 WOLCOTT ST. DETROIT 20, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 91

MEN YOU SHOULD KNOW . . . . . .

Charles E. Schmitt

Carl F. Jensen

Raymond N. Gruber

Charles J. Betz

John W. Breitmayer

CLEVELAND Electronic Production Gages Fill *Lamb Electric's* Need for Quick Setup, Precision, Efficiency

LAMB ELECTRIC COMPANY makes standard and special motors in lots of 50 to many thousands. All armature shafts are checked at two or more points for diameter and out-of-round, to tolerances of .0002″ to .0005″.

Small-lot production requires frequent changes in setup of gaging equipment. High production of standard items calls for rapid inspection; and close tolerances require gaging equipment that is sensitive and dependable. To meet these requirements, Lamb Electric uses Cleveland electronic production gages, as shown—(1) for checking single OD's at the grinding machines, and (2) for checking diameters two at a time in 100% final inspection.

The gage heads are on fixtures built by Lamb Electric. The operator rotates the shaft on an anvil beneath the gage head, and observes the deviations in size shown on a meter. On dual units, two gage heads and meters are used—one for each diameter.

This equipment gives these specific advantages:

Quick Changeover. Ralph Nash, Chief Inspector at Lamb Electric, says "We can set up our Cleveland gaging equipment in a couple of minutes."

High Sensitivity. Amplifiers that read .0005″ or .000050″ per scale division (selected at will) give this user the desired range and sensitivity. Other standard amplifiers read .0001″/.000010″ per division.

Checking armature shaft at the grinding machine for OD and out-of-round, using Cleveland electronic production gage.

Dependability. The frictionless gage head movement, drift-free amplifier and high-speed meter assure consistent repeat readings. • Lamb Electric have used Cleveland gaging equipment continuously for five years, and Mr. Nash reports "Maintenance is no problem."

Cleveland electronic gaging equipment may be what YOU need for faster, more accurate gaging—or for licking some special measurement problem. Illustrated bulletins will tell you. Write!

One of five final-inspection setups for checking OD and roundness of armature shafts at two points simultaneously.

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Charles E. Schmitt, former machine and tool buyer for the Cleveland Cadillac Tank plant, has been named sales engineer for the Ace-Central States Machine Tool Company of Detroit. Schmitt has his office in the Carnegie Hall Building in Cleveland. He is a mechanical engineer and has been associated with the tool and die industry in Detroit and Cleveland for many years.

◆

Carl F. Jensen has been appointed plant manager of the Des Plaines, Ill. Stamping Plant of the Shakeproof Division of the Illinois Tool Works in Chicago, Jensen joined Shakeproof in 1941 as a senior draftsman in the machine design department. He also served Shakeproof as a field sales engineer, central district sales manager and special stamping manager.

◆

Raymond N. Gruber has been named director of marketing research at the Standard Pressed Steel Co. of Jenkintown, Pa. Stepping into Gruber's former position as sales manager of Standard's Unbrako line of socket screw products, dowel pins and pressure plugs is Charles J. Betz. And John W. Breitmayer has been appointed to succeed Betz as assistant sales manager of the Unbrako line. Gruber, who originally set up the market research department at SPS, plans to enlarge the scope of the department's activities. He joined SPS in 1936. Betz started with Standard Pressed Steel in 1940 and transferred to Unbrako sales in 1951. Breitmayer's association with SPS began in 1941. In 1950, he went to customer service and transferred to the Unbrako sales staff last year.

. . . . MEN YOU SHOULD KNOW

F. R. Schulz

Dr. Newman W. Thibeault

E. H. H. Graf

Charles C. Reiff

John D. Tebben

Lamson Corporation of Syracuse, New York, announces the appointment of F. R. Schulz as its new field engineer in the Detroit area. He was formerly associated with the Mechanical Handling Company and the Palmer-Bee Company, both of Detroit.

◆

Dr. Newman W. Thibeault has been named assistant director of research and development of the physical research and microscopic sections of the Norton Company of Worcester, Mass. Dr. Thibeault previously was chief of Norton's physical research section.

◆

Announcement has been made by the Detroit Broach Company of Rochester, Mich. of the election of E. H. H. Graf as vice-president in charge of sales. Graf joined the company as sales manager early this year. Previous to his association with the Detroit firm, he was the Detroit representative for the Oilgear Company of Milwaukee, Wis.

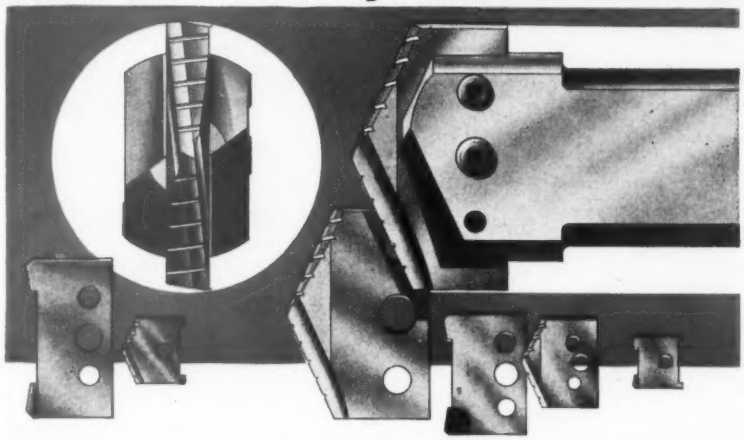
◆

Charles C. Reiff, chief engineer of the Rockwell Manufacturing Company's Barberton, Ohio plant has been promoted to chief engineer of the firm's Delta Power Tool Division at Bellefontaine, Ohio. Reiff joined Rockwell in 1950 as a design engineer with the Pittsburgh Equitable Meter Division.

◆

John D. Tebben, well known management consultant, has been elected chairman of the board and president of the recently organized Wagner Brothers Equipment Company of Wayne, Mich. Tebben has served for many years as management consultant for leading firms in the metal working industry.

NOW made by GAIRING

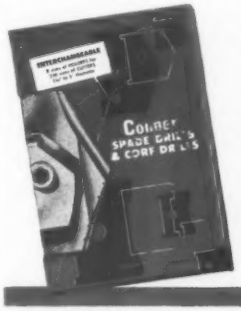


Drill Large Holes from the Solid with Interchangeable Spade Drills

Made in 256 cutter sizes, 1" to 5 inch diameter, in steps of 1/64, Conner type Spade Drills drill the required diameter in one operation, need no retracting to clear them of chips. Only eight sizes of holders are needed to handle all cutter sizes.

For general purpose work and in the Tool Room, use the cutter and holder assembly shown above. It is a rugged tool of great rigidity, recommended for large holes of medium depth.

For Production Drilling (for repetitive work), and for the somewhat deeper holes, use Conner type Oil Hole Holders designed for easy coolant flow and fast chip expulsion.



For Boring: Core Drill Cutters, for semi-finishing of cored and drilled holes, are made in the same 256 sizes, to fit the same spade drill holders.

The Gairing Tool Company is now the exclusive manufacturer of the Spade and Core Drills, both standard and special, formerly made by the Conner Tool & Cutter Company.

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CIRCLE INFORM-A-GRAM KEY NO. 93

CONTROLLING VISUAL CHARACTERISTICS ON PRECISION PARTS*

*by Aldis S. Hayes***

LOOK IN ANY ISSUE of **Industrial Quality Control** (or **Tooling and Production**—Ed.) and you will see many advertisements by companies which have found better ways of measuring things. In many cases, one of the primary objectives has been to minimize the human element. In some, the element of touch or feel is replaced by mechanical devices, while others are so automatic that the inspector himself is eliminated.

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YOU LOSE!
"Saving" by making your own punches is old-fashioned and expensive.
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1. PORTER PUNCHES are available for immediate delivery.
..... they save time — money — by keeping your expensive help at profitable jobs.
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..... punches made in your shop are probably made from "available" material ... often the wrong metal for the job.
3. PORTER PUNCHES are offered in standard—and decimal sizes.
..... so your experienced help doesn't spend costly time "whittling."
4. PORTER PUNCHES are reasonably priced.
..... only a "specialist" can make punches as well—or as inexpensively.
Check your labor costs — your "down-time"— and order
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Remember — you don't save by making your own punches — you lose.
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These are not isolated cases; they are typical of the unceasing effort to make up for man's inability to do repetitive work consistently. There is no such help for visual inspection, because by definition it must include the man.

When we talk about visual inspection and the control of visual characteristics in manufacturing, we are talking about an art. We are not working with precise measuring instruments which themselves can be measured for error, nor are we dealing with specifications which can be tested in a laboratory against the requirements of the product.

We are dealing with the ability of people to judge the attributes of a product, based on, at best, a vague description of what other people think is good for the product. Or stated in another way, it is a problem of dealing with people, what they see, and what they think.

With this in mind, we should consider visual inspection with the idea that improvement—not perfection—is the goal. The returns for attaining a small amount of improvement will exceed those for failing to attain perfection.

Visual inspection has won for itself an unenviable reputation for being the least understood and most poorly controlled of the various operations which take place in a manufacturing plant. This can be attributed to a number of reasons, some of which have been mentioned. However, one of the chief ones is the fact that, unlike other inspection operations, it is usually forced into the position of starting out without a definite objective, or specification. About the most it can expect in the way of help in this respect is some statement such as "Parts must be free of objectionable defects, etc."

Too often, in self-defense, shop people have decided what kind

*Through the courtesy of the American Society for Quality Control, this article is reprinted from the Proceedings of the society's Seventh Annual Convention held at Philadelphia.

**At the time this paper was prepared, Mr. Hayes was associated with Perfect Circle Corporation as Quality Control Supervisor; he is now located at the Sandia Base, New Mexico.

CIRCLE INFORM-A-GRAM KEY NO. 94

and degree of attributes are objectionable instead of insisting on having the objectives specified by the engineering department. Thus, the inevitable postmortem discloses the superior judgment of hindsight. This is not to recommend that shop people discontinue the practice, but rather that they do a more thorough job of it.

The first step in tightening up the operation is to establish standards. To do this, we must decide at what point, as a given type of defect increases in size or number, we will no longer accept a part. Each company must decide for itself, as a matter of policy, who makes this decision; but, however it is decided, these are the factors which will influence it — 1. Past practice, 2. Effect on function, 3. Sales appeal.

If past practice is to be the criterion, the reject point can be determined by sampling the outgoing quality or warehouse stock. But, to more accurately establish this point, we should be able to measure (no matter how crudely) the defect and classify the pieces into cells to form a frequency distribution. This is desirable because past practice will not be a hard and fast line, and we can better understand it by getting the full picture. It may seem that measuring a characteristic takes it out of the visual classification, but in the experimental work we can afford to do what would not be practical on a production basis.

If effect on function is to be the controlling factor, it can be tested just as would be any measurable characteristic, after the material has been classified as above. The scale for these classes might be length of scratch, depth of scratch, number of pin holes, etc.

When the decision is to be based on sales appeal, the quickest solution is to assemble a suitable sample and test it on the salesmen. It might be possible to present the problem to the customer for an opinion, but this would fall under marketing research and need not be discussed here.

In any case, the final decision must be described as well as possible in the form of a written specification. It should be written in **figures, not in adjectives.** The more explicit this specification can be, the more consistent can be the inspection, for whatever is lacking in the specification must be made up by the inspectors.

After the standard has been selected, it should be tested on the people who are concerned with it to see if it is practical from a use standpoint, and if it really represents the desired quality. It is especially important that sales and engineering people be brought into this because they are often critical of inspection that is less than perfect. Participation will help them understand that visual inspection will fall short of perfection even with the best of inspectors.

Nothing is so useless as a specification which draws too fine a line between different sizes of defects, or which makes too complicated the various combinations which are allowable. For example, in a statement covering foundry defects, it is better to limit the tolerance to one defect of a rather generous size (say .020), than to permit one of .015,

. . . *Continued on page 96*

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two of .012, and three of .010. The final result will be about the same in either case, and the more simple statement will better describe what is actually being done.

The testing can be done by assembling a sample of about 50 pieces which cover a wide range of size and number of defects—but only one type of defect in a test. Some pieces should have no defects, while some should be so obviously unacceptable that no one will pass them. Present the sample to each person once, then several days later a second time, disguising the identity of individual pieces so the second set of decisions will be unbiased by the first.

This will produce as many answers as we have people, and some very interesting results. We are likely to find that someone rejected a piece which we thought had no defect, while someone else accepted one of the pieces which we placed in the sample because no one in his right mind would pass it. Then, too, someone (not an inspector) will almost surely divide the pieces into three piles—pass, reject, and borderline—as though borderline pieces could be set aside and the decision postponed until they either got better or worse. Discounting the obvious radicals though, we will have some useful information here.

With this information we can answer these questions.

1. What is the inspector's ability to make the decision both times on a given piece? There will always be some reversals, but too many may mean that too fine a line has been drawn between good and bad quality.
2. Does it take too long to judge a piece?
3. Is the dividing line between good and bad a natural division? Quite often this will have to be a compromise between what we would like to have, and what is convenient. For example, we may be willing to accept a 100 micro-inch scratch but decide on 70 because that is just the point at which a scratch can be felt with the point of a dull, soft lead pencil.
4. What is the general acceptability of the standard to engineers and salesmen? That is, is it the proper balance between cost and quality?
5. How much spread is there between engineers and salesmen? Too much difference will lead to grumbling between the extreme individuals.

During this testing, special attention should be given the possibility that this particular characteristic is not objectionable and should therefore not be considered a defect.

One of the most important results of having a standard is the elimination of drift in judgment. This drift may be caused by a shift in process average, because an inspector tends to reject the same percent of pieces in each lot. If he is accustomed to rejecting about 2% and then gets a lot which is 10% defective, he will probably be a little lenient and reject only 8% or 9%. On the other hand, if he gets an exceptionally good lot, he will be more critical, figuring that if he doesn't find 2% he must have missed some.

Complaints are another cause of drift. No matter how well an

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CIRCLE INFORM-A-GRAM KEY NO. 96

inspection department is organized, receipt of a complaint is the signal to start a tightening-up process. This may go on for several weeks or months, until the increase in cost becomes noticed, at which time a lossening process starts. Like the pendulum of a clock, the only time it is on center is when it is going from one extreme to the other.

It would be impossible to eliminate all of this drift because the human factor of judgment cannot be limited to definite boundaries. Fairly well defined standards will, however, provide some restriction to the drift, and at least enable us to know the point from which we have moved.

No matter how well written and clear-cut the specification might be, it doesn't necessarily follow that the inspectors and foremen will follow it. Months and years of operating on their own initiative will form habits which are not easily changed. To assure conformity, it will be necessary to spot check regularly. In fact, it will be necessary to do this kind of checking as long as we want reliable visual inspection. This will catch any general tendency to lose sight of the objective. It will also spot the occasional individual who feels the right to inspect the way the boss would have told him to inspect if he had been on the ball.

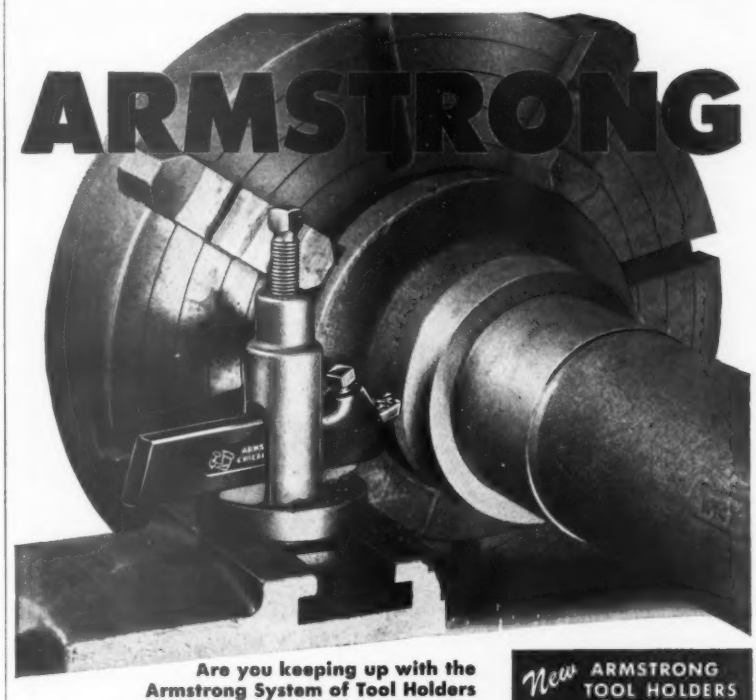
A convenient method of recording this information consists of charting on one graph the percent defective in the outgoing material and the percent good in the rejected pieces. Using the central horizontal line on the chart as zero, plot one above and one below this line. Thus, at a glance one can see if an inspector tends to be too critical, too lenient, or both. If the department operates more than one shift, this can be put to advantage by making a chart on each one in order to determine the difference between foremen. The foreman's characteristics should not be overlooked, because he influences his people, and whatever bias he has will very likely show up in the way they work.

Again, this is a problem of human nature, and each person's work reflects the way he thinks. Some people are cautious by nature and will take out insurance by being overly critical. To them, security results from rejecting every questionable piece. Others are more easy-going and can mentally flip a coin on borderline pieces. It is important to recognize these differences in people and make some allowances. If a person is near the mean in his judgment, it is better to leave him alone than to point out small errors. Even a mild criticism may produce an over-correction, leaving the situation worse than it was originally. A policy of correcting small errors might very well upset the whole department to the point where no one would be sure just what was expected of him.

With reliable inspection as a foundation, we can with more confidence, consider the problem of control of the manufacturing operations. The sources of visual defects may be: 1. Material, 2. Equipment, 3. Processes, 4. People.

Conventional scientific analysis will determine which of these four is at the bottom of the trou-

. . . *Continued on page 100*



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Doubtless you are daily using ARMSTRONG TOOL HOLDERS that have been in continuous operation for many years. This is sound practice, for this means added profits without added tool costs. But to become complacent, so satisfied that you forget your ARMSTRONG TOOL HOLDERS, is unwise. The "Armstrong System" is a growing thing, with new types and sizes of ARMSTRONG TOOL HOLDERS constantly being developed to more effectively meet new machining conditions, or to take advantage of newly developed cutting materials.

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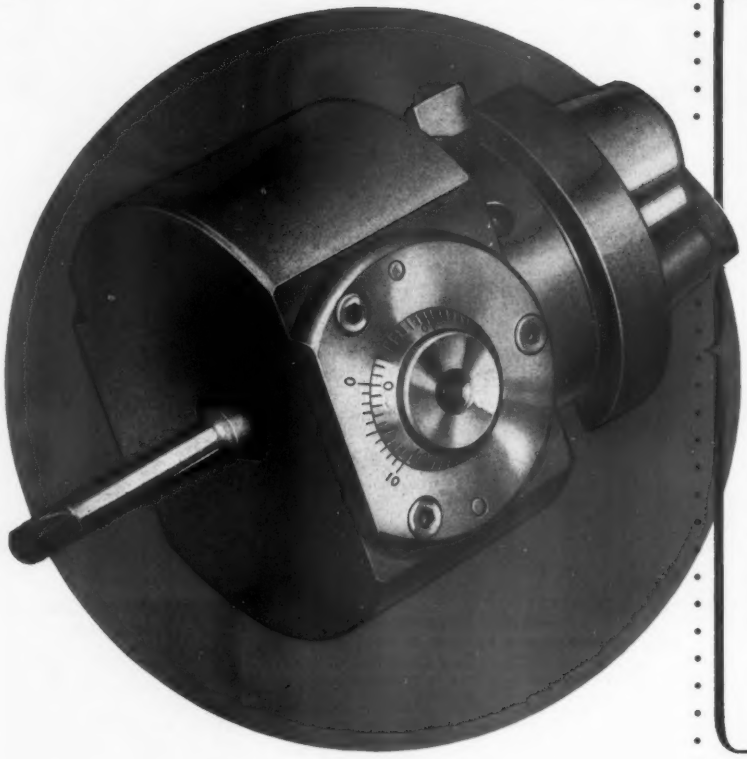
MICROBORE
by DE VLIEG

FOR PRECISION BORING



The NEW MICROBORE MB-121 ADJUSTABLE BORING HEAD

This Boring Head is adjusted rapidly and accurately by means of proven Micrometer Vernier principle. The tool slide can be adjusted in accurate increments from zero to ¼" off center. The boring head can be furnished with straight, taper, or flanged type shanks to suit any make of boring machine. With a standard set of boring tools, bores ranging from ¼" to 1" diameter can be machined.

Illustration at right shows boring head with standard set of boring tools mounted in a fitted hardwood case.

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VERSION DIE MANUAL

Now off the presses and available to TOOLING and PRODUCTION readers is the new enlarged edition of the Verson Die Manual. It contains 112 pages devoted to a pictorial presentation of Verson press brake

dies and special tooling along with detailed data on how to select dies for specific jobs, tonnages required, etc. Also presented in this edition is a place for recording the basic specifications of the press brake in your shop. This comprehensive and useful manual is offered by the Verson Allsteel Press Co., 9335 S. Kenwood Ave., Chicago 19, Ill.

Circle Inform-A-Gram No. C1.

"The Tool Steel Trouble-Shooter" is a practical handbook designed to help identify and correct the most frequent causes of tool and die failures. Available from the Bethlehem Steel Company, Inc., Bethlehem, Pa., the 125-page book analyzes 107 typical tool failures, tracing each one to its initial cause.

Circle Inform -A-Gram No. C2.

Drilling Calculator. You can make drilling production calculations simply and quickly with the Fosdick Drilling Calculator. Just set material, drill size, depth of hole and feed. Then read rpm, drilling time and horsepower required. It's available from the Fosdick Machine Tool Co., Cincinnati 23, Ohio.

Circle Inform-A-Gram No. C3.

Tap Selector. This convenient pocket-size slide chart brings basic tap information right to the user's finger tips and makes it easy to select and specify the correct drill and lubricant as well as the proper tap for each job. Information for both fractional and machine screw size taps includes recommended drill size with decimal equivalent; recommendations for various classes of fit; major pitch and root diameters and tap limits for various grinds. The selectors are available from the Threadwell Tap & Die Co., Greenfield, Mass.

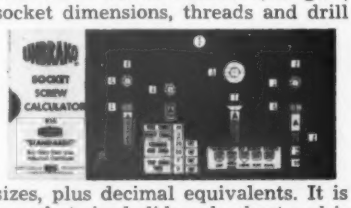
Circle Inform-A-Gram No. C4.

PNEUMATIC GAGING

Pneumatic gaging, as its name implies, is a means for measuring dimensions by the use of air. Here is a paper explaining the application of an air jet to the measurement of dimensions using the familiar laws governing flow through an orifice. The paper also shows how air jets can be incorporated into various types of gaging fixtures to solve a number of unusual, as well as common gaging problems. The article compares features in pneumatic gages with those of other conventional measuring gages and describes some of the requirements associated with the use of pneumatic gages. The paper is taken from an illustrated lecture delivered by David B. Kirk at a meeting of the American Society of Mechanical Engineers. It is being published by The Moore Products Co., H & Lycoming Streets, Philadelphia 24, Pa.

Circle Inform-A-Gram No. C5.

Socket Screw Calculator. This slide chart shows diameters, lengths, socket dimensions, threads and drill



sizes, plus decimal equivalents. It is a pocket-sized slide-rule chart and is available from the Socket Screw Division, Standard Pressed Steel Co., Jenkintown, Pa.

Circle Inform-A-Gram No. C6.

Decimal Equivalent, Tap & Screw Chart. An easy to read chart printed on grease and dirt-resistant vinylite will be sent on request by the Reiff & Nester Co., Lykens, Pa. This pocket-size chart lists fractions and decimal equivalents from 1/64 to 1" by

64th's in a convenient order which permits ready reference and quick selection. On the opposite side are National Coarse and National Fine Threads plus ASME standard and special threads with equivalent tap and body drill sizes.

Circle Inform-A-Gram No. C7.

Fan Engineering Manual. A complete, 64-page, illustrated guide to modern industrial ventilation and air movement is being offered by the Aerovent Fan Co., 720 E. Ash St., Piqua, Ohio. The booklet contains engineering, installation and operat-

ing data for all standard and special-duty fan applications. Pertinent details for calculating duct sizes, friction losses, performance and horsepower requirements, are included. An additional feature is a section devoted to Aerovent fans and accessory equipment.

Circle Inform-A-Gram No. C8.

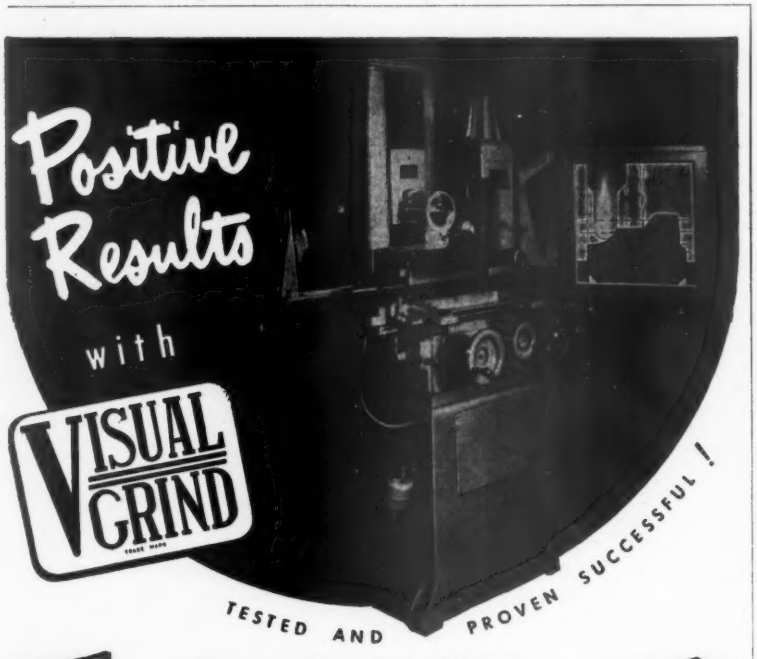
. . . Visual, from page 97

ble. A fairly permanent fix can be obtained through the use of receiving inspection, periodic inspection of equipment, experimental testing of processes, etc. —on all but number 4. Nothing so direct and positive will work on people. People respond to persuasion, repetition, competition, persistence, and explanations in terms of their own needs.

Incentive is a necessary part of any job—whether it be operating a machine, inspecting, engineering, or supervising. The need is recognized and pretty well taken care of in regard to the quantity produced by production people, but quality incentives are much less common. As with professional and supervisory personnel, too much dependence for incentive is placed on what is called a man's pride in his work —or craftsmanship. There is such a thing, of course, and it has a certain amount of pull, but it is not reasonable to expect it to hold its own against the dollar value placed on quantity.

The unfavorable balance between quality and quantity is further accentuated by another factor. It is the immediate and certain effect which low quantity has on both the man and management, versus the delayed and uncertain effects of poor quality. These things are especially important in dealing with the control of visual characteristics, because the behavior of people is such a large part of the problem.

The problem then is to get the maximum pull with the least delay. These requirements are us, or paying for only the good pretty well met by a quality bonpieces produced. Unfortunately, many manufacturing processes make it impossible to accurately assign operator responsibility for defects in every case—a requirement for the two systems just mentioned. The only alternative then is to rely on indirect incentives such as posters, pride in workmanship, and percent defective charts placed in the shop to create competition between individuals and shifts.



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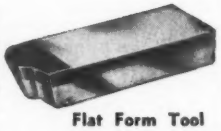

Flat Form Tool

Circular Form Tool

Dovetail Tool

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CIRCLE INFORM-A-GRAM KEY NO. 100

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In the case of a consistent offender, it is necessary to consider the possibility that the man is not suited to the job. Like Typhoid Mary of medical fame who was an incurable "carrier", some operators are not capable of being alert to the products which they are producing. They have no knack for combining good quality with the press for production. It is not a matter of training or discipline, it is a matter of instinct. Dismissal may be the answer, but not necessarily so, for many of these people are better than average when working at one of the maintenance trades.

Conclusion: Visual inspection depends almost entirely on the ability of people to see, recognize, and interpret. It is not a science and should not be shied from because it cannot be treated with the conventional scientific methods. Like any other patient. it will respond more to sympathy and enthusiasm than to neglect.

A. F. DAVIS WELDING LIBRARY AT THE OHIO STATE UNIVERSITY ADDS 2,200 ABSTRACTS OF BRITISH WELDING PATENTS

The A. F. Davis Welding Library located at The Ohio State University in Columbus, Ohio, has recently acquired over 2,200 abstracts of British Welding Patents which are classified in the usual manner according to R. S. Green, Professor and Chairman, Department of Welding Engineering at the University.

This library was established in 1942 by A. F. Davis, Vice President and Secretary of The Lincoln Electric Company, Cleveland, Ohio. The objective of the library was to assemble in one place all the important literature on welding. It is located at The Ohio State University, the only university offering a five-year course in welding engineering and leading to the degree of Bachelor of Welding Engineering.

The facilities of the library are offered to industrial engineers, designers and technicians and others interested in research and information on the various forms of welding and their application to design, construction, manufacture or maintenance of metal products and structures.

Over 15,000 patents have now been classified in the A. F. Davis Welding Library collection.

Inquiries for patent searches have been received from nine states, the District of Columbia, France and Great Britain, to date. The types of activities represented by users of the patent classification system are: governmental, welding equipment manufacture, instrument manufacture, ship building, piping fabrication and erection, pressure vessel manufacture, machinery manufacture, navigation equipment manufacture, crane manufacture, glass manufacture, aluminum production, and patent attorneys.

A typical inquiry is as follows: "It is noted in the December 21, 1950, issue of the "Engineering News Record" under the article, "Another Surrender at Yorktown" which describes the new bridge being constructed over the York River, a special welded pipe tower was used to move the caissons in place. In the article the following appears:

"The towers are fabricated entirely of steel pipe connected at the panel points by special gusset plates made by design patented by . . . ."

After searching Division P, pipes and tubes, the patent number was located in comparatively few minutes, and the inquirer was given the number of the patent.

Since July 4, 1950, the A. F. Davis Welding Library has purchased the Patent Gazette. Each issue of the Gazette is checked, item by item, to search out patent specifications relating to the welding industry. These summaries are cut from the Gazettes and pasted to the classification card. Thus, from 1950 the classification system has a very complete record of the welding patents issued. Old Patent Gazettes covering the period of March 2, 1943, to December 25, 1945, have been obtained and searched also. Advice is solicited from any corporation or individual having back issues of the Patent Gazette which they would be willing to contribute to the Davis Library. These back issues of the Gazette would be used to make a more thorough coverage of patents relating to welding. It should be noted that the present collection of over 15,000 patent specifications includes patent specifications published from the early days up to the present time. However, search of the Patent Gazettes is the means whereby a library can determine that it has all of the relevant material from the period.

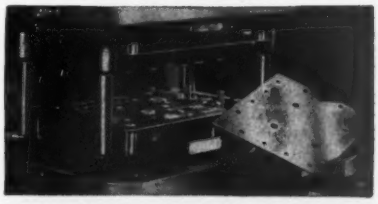
New • Fast • Proven

LOW COST methods for PERFORATING and NOTCHING SHEET METALS

REDUCE DIE COSTS

All units and parts are interchangeable and used repeatedly in different arrangements. **INCREASE PRESS PRODUCTION**—*Down time is minutes as compared to hours for change-over.* For precision work in all types and sizes of presses. **START PRODUCTION AT ONCE.** Pierce materials up to ¼" thick mild steel. Standard sizes and shapes available up to 3 inches. Special sizes to order.

Whistler *MAGNETIC* Dies at work in large inclinable press. Magnetized retainers hold the units. No bolting required. A fast, economical method in making up a punch and die set for short or long runs. All parts re-usable.



Whistler *ADJUSTABLE* Dies on perforating and notching job, using Tee slotted die set. With Whistler Adjustable Punch and Die units production starts within hours instead of weeks. Last minute job changes made quickly.

● Here are the complete details with prices and application illustrations. Send for these catalogs. No obligation.

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Adjustable, Magnetic, Custom and Cam Dies for all Industry

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CIRCLE INFORM-A-GRAM KEY NO. 101

How To Run A Production Test Of Metal Abrasives

THE REAL TEST of any abrasive is how does it work in your shop, in your machine, on your product. Laboratory test procedures are useful in comparing one type of abrasive versus another but, in the last analysis, the performance of various kinds of abrasives can only truly be judged by production tests run under the conditions prevailing in your operation. It is understandable that users of metal abrasives are reluctant to upset their production by running a series of tests. In the past few years many different types of metal abrasives have been placed on the market and, as each new type hits the market, the user is asked to try it. This article deals with a simple method of running a production test that will eliminate the hesitancy that production men have shown in upsetting their existing practice.

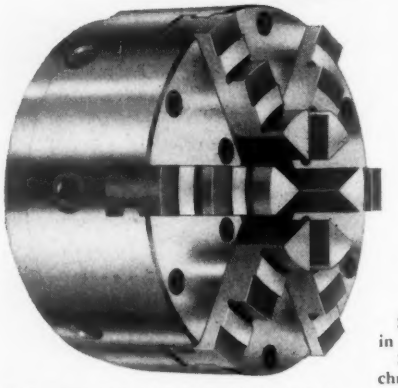
by Wm. O. Faxon
General Manager
HARRISON ABRASIVE DIVISION
Metals Disintegrating Co., Inc.
Elizabeth B, New Jersey

There is obviously a practical limit to which a user of metal abrasives should go in testing shot and grit. On the other hand, it is equally obvious that the user should assure himself that he is using the type of abrasive best suited to his conditions. By best is meant the one that yields the desired results at the least overall costs. The words "overall costs" are essential since in the past many of the factors of cost have not been given full weight.

In running a production test, it is not necessary to dump your machine of the abrasive now being used. Likewise, it is not necessary to replace blades or undertake major repairs of your unit before the test. In fact, it is not desirable to do so. In comparing one abrasive versus another, it is better to try to keep all other variables the same. A rebuilt machine will obviously run better, irrespective of the abrasive, and it is not wise to credit the abrasive with better operation if, in fact, the improvement is due to rebuilding of your machine. An auto just out of the repair shop runs better no matter what gas you are using. Thus, in running a production test, try to keep all other variables constant and only vary the abrasive — same maintenance program, same operating conditions, same type of work, same degree of finish. If your machine needs rebuilding and major repairs, make them at a time that does not upset your comparison of the types of abrasives.

The only true measure in testing abrasives is the final cost per unit of work, i.e. tons of castings cleaned, pieces (or tons) peened, square feet of granite sawed, etc. In the following discussion, we will confine ourselves to the unit of tons of castings cleaned but other units of work can be substituted depending upon the particular operation with which you are concerned. The main point is that the unit of work and the costs in relation to it are far more important than wheel-hours or time units. One type

YOU SAVE
Every Time You Use
Buck
AJUST-TRU
Pat. No. 2639157
CHUCKS



This is the only universal scroll chuck with .0005" precision. It is used on lathes, grinders, dividing heads, screw machines. Does most of work formerly requiring stub arbors, mandrels, special fixtures.

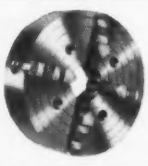
6 JAWS

OR 3 JAWS

3-jaw and 6-jaw models in 4", 5", 6", 7½", and 9" sizes. 2-jaw Aviation chucks, for holding odd shaped parts in 6", 7½, and 9".

Save machinists' time — lines up dead true in *one* minute, without shims . . .
Save operators' time — holds .0005" re-chucking precision on duplicate parts . . .
Save collet and step-collet costs — the AJUST-TRU does the work of hundreds of dollars worth of collets . . .
Save distortion on tubular work . . .
Save scratches on ground, polished, work . . .
Save time and expensive holding fixtures on many grinding operations . . .
Save chuck wear — it takes up wear in use . . .
More than ever today, you need the economies of Buck chucks. Send for latest catalog.

BUCK TOOL COMPANY
1118 SCHIPPERS LANE • KALAMAZOO, MICH.



NEW SUPER-GRIP 4-JAW
INDEPENDENT CHUCK FOR 9" to 16" LATHES

Most chucks for 9" to 16" lathes are either too light and cheaply made to hold work securely, or too heavy for the lathe and clumsy to handle. Here's the happy medium — a chuck with ideal weight, providing much more "holding power" from its ⅛" larger diameter, finely threaded screws. Also eliminates ⅝" overhang . . . improves accuracy . . . permits heavier cuts. 6", 8" and 10" models. Send for latest catalog.

CIRCLE INFORM-A-GRAM KEY NO. 102

of abrasive may take twice as long to produce the same effect as another. Hence the common denominator should be tons of castings cleaned to the degree required by you.

In preparing for a production test, the first thing to do is to establish the number of tons of castings charged per day to the machine being used for the test. Your normal production records may develop this figure now. If not, we advise that subsidiary records be kept that will at least provide a reasonable approximation. It is against this figure that all the test data will be related.

The second thing to do is to determine that minimum time cycle required to clean the castings to your satisfaction for the type of abrasive that is now in your machine. In too many instances the time is far greater than needed. It is foolish to run your machine any longer than actually required. Over-blasting means unnecessary wear on your wheel blades, deflector plates, aprons, etc.—work that does you no good and merely costs money. We can well understand that the problem of a set work load may be involved with your operator. Decreasing the blasting time does not necessarily mean that you need increase the number of times the operator has to load and unload the machine. Maintain the same cycle of loading and unloading if you are dogged with restrictive work loads by your Union, but shut off the wheel the minute you have reached the desired degree of cleaning. A simple time switch, like on your electric stove, is very useful in assuring that the machine does not over-blast. The operator need merely turn the pointer to the time desired for blasting, and the machine turns itself off rather than depending upon the operator to watch the clock. If possible, also use an elapsed time recording clock which will readily give you the figure of hours that the machine (i.e. shot wheel motor) runs each day.

Let us assume that you are currently using Type X abrasive. For a period of several days, continue to charge Type X abrasive keeping a record of the number of bags added per day, the tons of castings charged and the hours that the machine ran. Record and plot your daily figures. Continue until you are satisfied that you have obtained figures that are truly representative. By simple calculation you can then establish the "number of pounds of abrasive used per ton of castings cleaned" and the "machine hours per ton of castings cleaned" for Abrasive X.

Start charging Abrasive Y to your machine and continue your plots. It is not necessary to dump or clean the machine. In a short period of time Abrasive Y will have replaced Abrasive X. The plot may be somewhat erratic during the transition period but, after a reasonable period of time, the plot will begin to show a consistency that indicates a stable condition. It is important at this time to check your time cycle or to re-establish the minimum blasting time required to clean your castings to the same degree as with Abrasive X. As pointed out above, this is an essential part of the test and one which may affect

. . . *Continued on page 127*

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THE CLARKSON CUTTER GRINDER

Simplicity . . . Speed . . . Economy are featured in the Clarkson Cutter Grinder . . . designed specifically for use in the manufacture of Clarkson Milling Cutters. All of the desirable features recognized as essential through years of experience, to the manufacture of cutting tools are incorporated into the Clarkson Cutter Grinder, yet it is low in cost, *right* for use in *your plant* for resharpening

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Gentlemen:
Please send full information and prices on the Clarkson Cutter Grinder.
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DEDLOCK CHUCKS • AUTOLOCK CHUCKS • MILLING CUTTERS • CLARKSON CUTTER GRINDERS

320 Ontario St., Toledo, O.

CIRCLE INFORM-A-GRAM KEY NO. 103

Die-Cut Parts

The Dayton Rogers Mfg. Co. of Minneapolis, Minnesota, has announced a new improved

method of producing precision die-cut parts with a high degree of accuracy.

Under this new improved method, the size and relative location of pierced holes is now being held to plus or minus .001".

This process lends itself to the die-producing of all sheet materials that can be stamped, such as all sheet and alloy steel, nonferrous sheet materials, including fiber, bakelite and other sheet stock. Practically any gauge can be blanked and pierced to the desired shape and size, from .001" material up.

Apprenticeship Training At Kearney and Trecker Pays Firm Rich Dividends

An analysis of the operation of the apprenticeship system of the Kearney and Trecker Corp., West Allis, Wis., indicates that apprenticeship pays rich dividends over the years. A company may depend on its apprenticeship program not only for its supply of skilled craftsmen, but also for supervisor and administrative personnel.

The study also indicates that making a particular official of a company primarily responsible for training helps to insure adequate attention will be given this activity. Moreover, careful selection and close supervision of the apprentices are reflected in the high proportion who complete the training program.

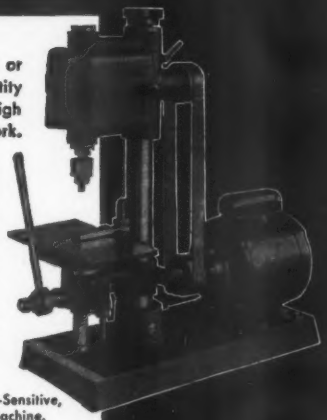
Copies of the Kearney and Trecker apprenticeship analysis may be obtained free of charge from the Publication Branch, Bureau of Apprenticeship, U. S. Department of Labor, Washington 25, D. C.

YOU CAN DRILL OR TAP TINY, PRECISION HOLES . . . ON A PRODUCTION BASIS . . . WITH MINIMUM SCRAP AND MINIMUM TAP AND DRILL BREAKAGE

BUT YOU MUST FIT THE TOOL TO THE JOB

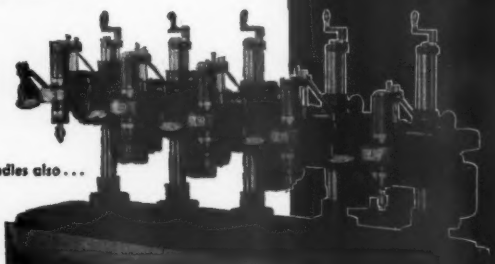
When your job calls for tiny, precision holes, drilled or tapped, rely on this; such holes can be produced in quantity and within allowed tolerances only on super sensitive, high precision machines designed and built for this class of work.

HAMILTON Drilling Machines and Tapping Machines are super sensitive and extra accurate; designed and built for the production of tiny, precision holes. The drilling machines produce holes up to 0.3125" maximum — to the center of 10" — in any drillable material — on fast production schedules. The tapping machine is designed to use the smallest and finest tap and up to 10-32 inclusive.



The HAMILTON® Super-Sensitive, Small Hole Tapping Machine.

The Hamilton VARIMATIC® Super-Sensitive, Variable Speed, Small Hole Drilling Machine.



Multiple spindles also . . .

Acquaint yourself with Hamilton Super Sensitive, Small Hole Drilling and Tapping Machines and be ready for the challenge ahead. Ask for our FREE Bulletin DT-5308.

THE Hamilton TOOL COMPANY

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INDUSTRIAL NEWS

Buckeye Brass and Manufacturing Company. Mr. Leon P. Disinger has announced his resignation as of August 22nd, as Vice-President and General Manager of The Buckeye Brass and Manufacturing Company, Cleveland manufacturers of bronze bushings and bearings.

Mr. Disinger has a wide acquaintanceship and association in manufacturing and industrial circles as well as the bearing and power transmission industry. Starting with the Buckeye Brass and Manufacturing Company in March, 1923, in factory work, Mr. Disinger has held progressive executive positions as Factory Manager, Sales Engineer, Sales Manager; and as Vice-President and General Manager.

Vanadium Corporation of America. The appointment of Shardlow E. Crawford as assistant to the Controller of Vanadium Corporation of America was recently announced by W. C. Keeley, president. Mr. Crawford, a graduate of Antioch College, class of 1936, formerly was associated with General Dyestuff Corporation.

Vanadium Corporation of America is the world's largest producer of vanadium, the second largest producer of ferro alloys and a foremost miner and miller of uranium, the basic material in atomic energy.

3-Dimensional Shop Planning Simplifies Layout Problems

Scale models of machine tools for making shop layouts are now offered on a free loan basis by the South Bend Lathe Works. Several models, each of 9 different machine tools, make up a stand-

Machine tools represented in the South Bend kit includes six sizes of bench and floor model lathes, pedestal tool grinders, drill presses and bench shapers.

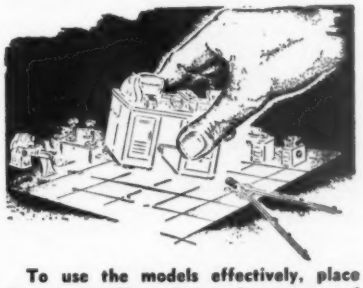
ard kit. Also included are models of mechanics and floor plan layout sheets that are cross-ruled to the same scale as the models.

To use the models effectively, it is only necessary to sketch the shop room floor plan to a scale on the cross-ruled layout sheet, indicating locations of doors, windows, columns, stationary benches and other fixed facilities. The machine tool models are then placed on the floor plan and moved around until a satisfactory arrangement is obtained.

The model kits are loaned without charge or obligation to any established organization that can use them for planning a new shop or the rearrangement of present shop equipment. The

The South Bend models are made to a scale of ¾" to 1' and are finished in natural colors.

borrower is expected to pay transportation costs both ways and to return the models promptly. Shipments will have to be made in the order requests are



To use the models effectively, place them on the floor plans and move around until a satisfactory arrangement is obtained.

received. Full information can be secured at South Bend Lathe Works, South Bend, Ind.

THE HAMILTON
PORTELVATOR®
(Portable Elevating Table)

MAKES IT *Easy* TO LIFT • LOWER LEVEL • TRANSPORT LOADS UP TO 5,000 lbs.

3 TABLE SURFACES
Can be worked at from ALL 4 SIDES

Slow or fast lift.

Self locking at any height.

4 POINT SUPPORT
(table can't tip)

Lift mechanism can be operated from either end.

Turns easily on anti-friction casters. Positive floor lock.

WELDED CONSTRUCTION

Mechanical lift through worm, worm gear and screw.
TABLE CAN'T SETTLE

STYLE "A" (Illustrated)*
Max. Height 40" Min. Height 25" Length 33" Width 21" Weight 225 lbs.
Capacity 2,000 lbs. (plus safety factor)
FURNISHED ON ORDER
SAF-T-RAIL — Guard rail fits either top or middle table.
ROLLER CONVEYOR TOP • RUBBER TIRED WHEELS

*THREE STANDARD MODELS TO CHOOSE FROM

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THE Hamilton TOOL COMPANY
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CIRCLE INFORM-A-GRAM KEY NO. 105

Shot Peening

Some wherefores of shotblasting automotive parts to give them added life or durability were discussed recently before a committee of the Society of Automotive Engineers.

The report was presented by Raymond L. Mattson and W. S. Coleman, Jr., of the Engineering Mechanics Department of General Motors Research Laboratories.

They explained that although industries in the past few years have adopted shot peening (or blasting) and other "cold working" methods to increase fatigue life of the particular parts they manufacture, certain variables about these techniques to a large extent are still unexplored.

Their report centered around a series of laboratory tests in which typical automotive leaf springs were shot peened and fatigue tested. The tests, dating back several years, involved more than 100 groups of four spring specimens. These, they said, were heat treated, cold worked and tested.

Approximately 50 of them were dissected and analyzed for residual stresses.

In surveying these groups of leaf spring test specimens, the GM Research team posted these general conclusions:

1. For shot peened specimens of this type it appears that there is a minimum shot velocity for each shot size to obtain best fatigue life. Air pressures greater than this value do not add to fatigue durability, hence are wasteful and costly. The minimum value is considerably lower than that normally used.

2. For shot peened specimens of this type, unless the degree of coverage (exposure time) is up to some minimum value, best fatigue life is not obtained. By using coverage greater than this value, no significant increase in fatigue life results. Hence, exposure times beyond this point are wasteful and costly.

3. For shot peened specimens of this type the influence of shot size on fatigue life is not particularly great over a full range of air pressures and exposure times.

4. For these specimens fatigue life was increased by 20 times over non-peened specimens.

5. By shot peening specimens while under tensile strain, fatigue life was increased by as much as 200 times over non-peened specimens and 10 times over strain-free shot peening. Greatest benefits were derived from shot peening while under strains greater than 80 per cent of yield strength.

6. Shot peening specimens of this type introduces residual compressive stresses of the order of 50 per cent of the yield strength of the material, regardless of the shot size and velocity. The depth of the compressed layer increases with both shot size and velocity, ranging between .006 and .026 for the treatments used.

7. Residual compressive stress considerably greater than 50 per cent of the yield point can be introduced by shot peening while the surface is under tensile strain.

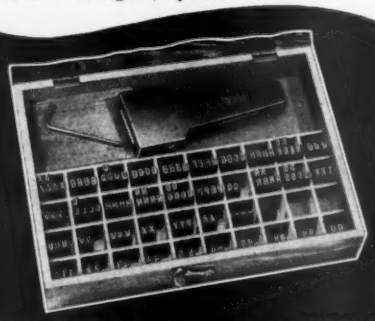
Although data are limited, the magnitude of residual compressive stress appears to be reduced by fatigue testing.

There is a direct correlation between the magnitude of residual compressive stress near the surface and fatigue life of the specimens.

When Reading Proofs Editors Use Marking Devices

tr TRANSPOSE C CLOSE UP
INSERT SPACE [] BRACKETS

When proof reading copy, busy editors find marking devices indispensable to indicate the type of corrections, transpositions, deletions, additions, and changes required.



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The faces of CADILLAC Steel Letters and Figures combine a high degree of hardness with toughness, insuring especially long life. All CADILLAC Marking Type and the recess in Type Holders are made in standardized dimensions. This means that type will fit interchangeably in hand holders, marking machine holders or punch press holders designed for the size type specified. Due to the precision adhered to in manufacturing, they will when assembled in any holder make impressions in perfect alignment.

HEAVY BEVEL HAND STAMPS
CADILLAC Heavy Bevel Letters and Figures combine a high degree of hardness with toughness, insuring exceptionally long life.

HAND STAMP SYMBOLS
A system of distinctive symbols for inspection and confidential markings. Write for Symbol Chart.

For full information write for Bulletin SE-130

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FACTORY and OFFICES
17303 RYAN ROAD • DETROIT 12, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 106

INDUSTRIAL NEWS

Allis-Chalmers Manufacturing Company. H. R. Wilson, a sales representative in the Indianapolis district office of Allis-Chalmers general machinery division since 1948, has been named manager of the company's Rockford, Ill., branch office.

A graduate electrical engineer of Rose Polytechnic Institute, Wilson has been associated with Allis-Chalmers since 1947. He is a member of the American Institute of Electrical Engineers.

◆

Howard Industries, Inc. Appointment of Harry D'Almaine as General Sales Manager of Howard Industries, Inc., Racine, Wisc., has been announced by Erling J. Hansen, President.

D'Almaine assumes his new responsibilities with a record of 25 years in Industrial Sales, progressing through all levels from sales engineer, district manager, sales manager and professional sales consultant. D'Almaine comes to Howard from Wincharger Corp., where he was Sales Promotion and Advertising Manager.

The new appointment inaugurates a move on the part of Howard to establish concentrated areas for expanded sales and promotion. F. Norton Park has been made Manager of Chicago Territory, with offices at 209 West Jackson Blvd.; W. Edward Macbeth, who is a Vice President of the firm, is Manager of Eastern Territory, with headquarters in the Empire State Building, New York City.

◆

American Gas Furnace Co. of Elizabeth, N. J., manufacturer of heat treating furnaces and equipment, has granted additional territory in New York State to the southeastern New York representative, of Pine Grove Circle, Scotch Plains, N. J. The new territory will extend representation from Glen Falls through metropolitan New York.

Transfer Mechanism Eliminates Hazardous Handling of Auto Brake Drums

This special transfer mechanism has been developed to index, advance and unload 22-lb. brake drums through a 600-ton coining press.

The press attendant is required only to place the drums in the pre-load position; subsequent operations are automatic. Previously, in order to locate the drums properly in the die, the operator had to place his hand beneath the punch. Aside from its inherent safety value, the mechanism enables users to utilize the full production capacity of the press.

Developed originally for a leading automobile manufacturer, the basic design is applicable to a wide range of feeding and unloading applications.

Photo courtesy Sahlin Engineering Company

For . . . TAPS
STEP CUTTERS
BORING TOOLS
PROFILE MILLS
CENTER DRILLS
ETC.
Inter-changeable cams and index plates for 1 to 14 flutes.
Inter-changeable collets up to 1.125" D.
Preloaded ball bearing spindle.
Easy-to-read settings. Easy to set up.
Base swivels for angular grinding.
Mounts on most grinder tables.
What a relief!
More Cuts Per Grind
Better — Freer Cutting
Reduce perishable tool costs with this preferred grind on your straight and spiral flute production cutters — Easy and fast as ordinary angular relief grinding.
D-S GRINDER DIVISION
ROYAL OAK TOOL & MACHINE CO.
621 E. Fourth St., Royal Oak, Mich.
D-S
RADIAL
RELIEF
GRINDER

First Machine Leaves New Cincinnati Shaper Plant

The new Whitewater Shop of The Cincinnati Shaper Company, manufacturers of shapers, press brakes and squaring shears, is now in operation. The first machine to leave the plant was a ½" x 10' Cincinnati All Steel Plate Shear which was shipped to the Kropp Steel Co. in Rockford, Ill.

The new shop building is 650 feet long by 160 feet wide and is equipped with two 50-ton cranes on the high rail and two 10-ton cranes on the low rail. Another 25-ton overhead yard crane has a 250-foot runway.

The new shop is located west of Cincinnati accessible to the

New York Central Railroad on a tract of land approximately 250 acres.

Ultimately, a large machine shop and an office building will be added to complete the consolidation of manufacturing facilities.

MÄGERLE HYDRAULIC SURFACE GRINDERS

AUTOMATIC DOWN FEED

•

AUTOMATIC FINISH SIZING

A work measuring instrument reveals the difference between work size and required final size during the grinding operation . . . The automatic feeding and sizing is powered by a separate electrical unit . . . The machine requires no attendance during the grinding operation

Finishes within .0002 on repeated chuck loadings automatically . . . Rapid traverse is provided for both head and cross slide . . . Extremely rugged construction and very easy to operate . . . Available in 2 foot, 3 foot and 4 foot models . . .

Write for Our Eight-Page, Illustrated Circular.

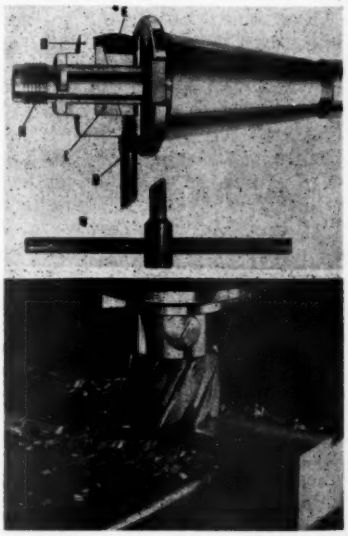
PELLOW MACHINE CO.

13500 FOLEY AVENUE • DETROIT 27, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 108

Selflocking Chuck Holds Cutters Rigid

Cutters from 2" to 6" in diameter can be held most rigidly with a new selflocking chuck made by Clarkson, Inc., 320 Ontario St.,



Toledo, Ohio. The unusually wide capacity of this chuck eliminates the conventional use of four different adaptors, thereby doing away a time consuming nuisance.

Called the "Dedlock," this

chuck also allows cutter changes to be carried out quickly and easily from floor level.

For machines having a taper smaller than No. 4 Morse, a damping device is fitted to eliminate vibration and add rigidity to the adaptor. This device screws from the body of the chuck against the spindle nose.

Hand pressure only is required to affix a cutter to the Dedlock chuck.

The top photo shows a cutaway view of the Clarkson Dedlock chuck. The cutter is screwed on the plug (A) and located on the ground backface (B) of the spigot. Note that plug is located between flats projecting from face (B). In operation, the cutting action forces the cutter tighter and tighter against face (B) setting up pressure which tends to pull plug (A) downward toward work. However, any movement of the plug is prevented by the drift (C) which passes completely through a slot in the body of the plug. To release the cutter, a slight turn of the key (D) forces the drift to move radially, which allows the plug to move axially away from the chuck. The drift is retained at all times by spring and retaining screw (E). Bottom photo shows the Dedlock chuck and cutters in action. **Circle No. D4.**

Gardner Machine Co. Begins Production of New-Type Grinder

The Gardner Machine Co. is now producing vertical spindle grinders capable of grinding 60 to 70 pieces of work per minute and holding them to very close tolerances for flatness, parallelism and uniformity.

The vertical column of this machine supports the grinding heads upon vertical slides and the slides are provided with hand wheels and feed screw mechanisms for raising and lowering the heads. These hand wheels are mounted upon the side of the vertical column in a convenient position for the operator.

The steel tank for the wet grinding system is set at one side of the machine and collector trays divert the coolant to this tank. A motor driven pump circulates the coolant to the abrasive wheels through hollow spindles, and a control valve is located at each entrance to regulate the amount of coolant supplied.

Two 7½ hp., 1800 rpm. motors with proper shaft extensions power the unit.

Photo courtesy of the Gardner Machine Co.

The photo shows ceramic insulators being ground. In the operation, two parallel surfaces of the insulators can be ground. The maximum overall stock removal on these pieces is 0.005".

DEBURRS 400% FASTER

SAVES 40 MANHOURS PER WEEK with

New FLASK-TYPE GLOBE TILTING TUMBLING BARREL

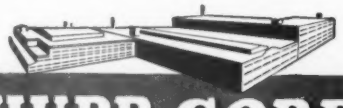
Former deburring of small precision electrical parts could be done by hand at a rate of only 40-50 pieces per hour, requiring a week for one run. One Globe Flask Type Barrel now handles the entire run of 2,500 pieces in one hour . . . a savings of 30% labor in the department. Tolerances held to .001 and .0005". These Globe Flask-Type Barrels handle steel, brass, aluminum and plastic parts with the same high output and quality finish.

Globe's new flask shell gives bigger pay-load capacity with tilting barrel control. It holds more, works faster with controlled agitation for uniform high quality parts. Low speeds for non ferrous and plastic materials.

FREE EXPERIMENTAL SERVICE

Hupp's experimental finishing laboratory will show you how to cut finishing costs. Just send samples of parts to be processed with a finished part. There's no cost or obligation.

Write Dept. F Today!



HUPP CORPORATION

GLOBE STAMPING DIVISION

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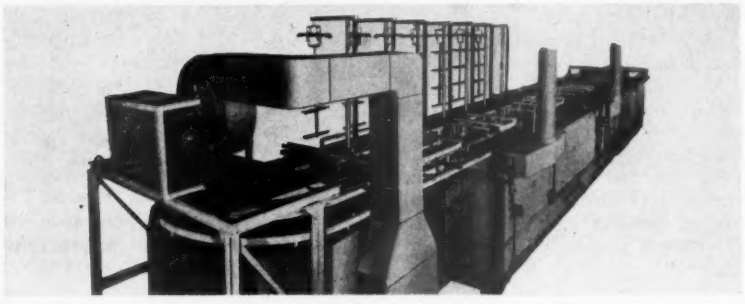
CIRCLE INFORM-A-GRAM KEY NO. 109

Transfer Machine Electroplates Work Automatically



Many complicated motions previously considered necessary for automatic plating machines, have been eliminated by the transfer and conveying principle embodied in the new Wagner Brothers fully automatic electroplating machine.

The machine has no elevating superstructure, no transfer cams, no chains or sprockets, and no hydraulic components or grease fittings above the tanks. The transfer mechanism has but two reciprocating movements—longitudinal and vertical.

All working parts are mounted on a central carriage that moves forward and back along a single track extending between two lines of cleaning and plating tanks, drying oven, loading and unloading stations. The carriage is actuated by an hydraulic cylinder, the stroke of which can be varied and decelerated at the end of the stroke by cam controlled valves.

A drive shaft running the length of the carriage, near its top, is fitted with gears that mesh with gear racks on the work-lifting arms. Rotation of the shaft in one direction causes work-lifting arms on one side of the carriage to be raised, while those along the other side are being lowered. Rotation of the shaft in the opposite direction reverses the opposing vertical motions of the work-lifting arms. This shaft is driven by a reversible Hydromotor, controlled by limit switches and solenoid valves. The balancing of the work load, as provided by this system, means that only minimum power is required for vertical movement of the work.

In operation, the plating baskets or racks are hooked to work carriers which are independent of the transfer mechanism. When the machine is set in motion, the work-lifting arms are lowered at the loading station, the carriage moves horizontally to permit pads on the lifting arms to engage the work carriers. The arms raise, lifting the work above the tank-top level. The carriage moves horizontally a preset distance, and the arms lower the work into the first cleaning tank.

Simultaneously, work has been lifted out of each tank along the

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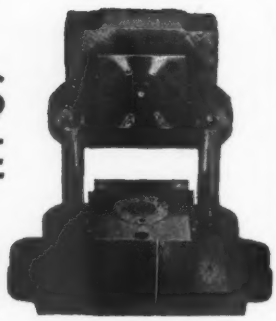
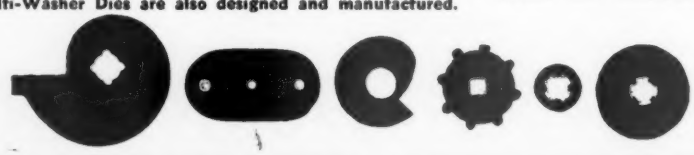
OFFERS YOU THIS SIMPLE, UP-TO-THE MINUTE METHOD

There's no need to make a complete new Die for any type washer or blank. The HOVIS UNIVERSAL WASHER DIES provide a Master Holder and by merely changing 5 SMALL, EASILY REMOVABLE PARTS the new washer or blank is produced . . . Special sets of parts are available for use in Master Washer Units enabling customers to produce irregularly shaped pieces and shallow draws. Multi-Washer Dies are also designed and manufactured.



Made in 5 sizes:
¾"—1½"—2½"—4"—6"

Write for literature.

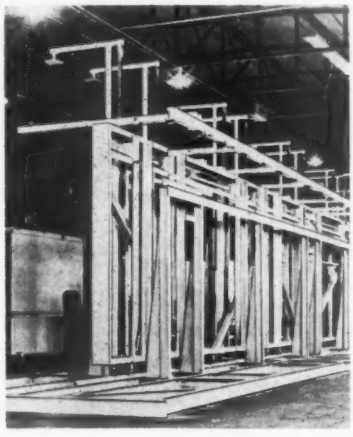


HOVIS SCREWLOCK COMPANY
8100 E. NINE MILE ROAD VAN DYKE, MICHIGAN
Phone: Slocum 7-4800 Suburb of Detroit

CIRCLE INFORM-A-GRAM KEY NO. 110

one side of the machine and redeposited in the next succeeding tank. The work-lifting arms swing free of the work carriers, are raised, and the carriage returns horizontally for its next load. While work is being moved forward on one side of the plating line, work is being returned on the other side having made a 180° turn at the end of the line.

When a work carrier is lowered into a tank, it is deposited on parallel anode and cathode rails, giving double contact and



assuring constant current supply to the work. Where no current is required, as for cleaning stages, the rails are not electrified. Where work must remain for a period, as in plating, the carrier is not picked up at each successive increment of forward carriage travel but is allowed to remain on the rails, being moved along by pushers actuated by the reciprocating carriage.

The basic power for the machine is provided by a single electric motor and Racine hydraulic pump. Two sets of controls afford flexibility for adjustment of timing of any or all parts of the complete operation. Adjustable hydraulic flow valves control speed of each movement. Adjustable electric interval timers allow for varying dwell time or for adjusting hesitation at the end or beginning of an immersion movement.

Efficient use of tanks makes possible the use of small, closely placed tanks and a resulting saving in floor space; and, as there is no superstructure, longer racks or baskets can often be handled under minimum ceiling height.

Deep Hole Drilling Trepanning and Boring

Beginning November 15th, American Boring & Trepanning Co. will conduct a formal showing at its plant in Centerline, Michigan, demonstrating the latest developments in deep hole drilling, trepanning and boring, standardized by the international Boring & Trepanning Association, more commonly referred to as BTA.

Both BTA Deep Hole Drilling Machines and BTA Tools will be demonstrated.

This will be the first time that BTA equipment has been made available to American civilian industry. Heretofore, BTA research and equipment have been entirely in support of the Allied defense effort.

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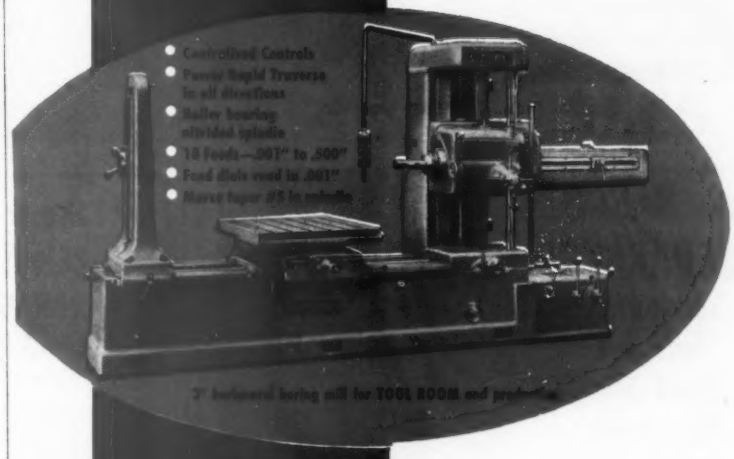
3" horizontal boring mill for TOOL ROOM and production

table top swivels full 360°

18 speeds—17 to 910 r.p.m.



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Users of the WOTAN Boring Mill find that advanced engineering and expert craftsmanship have combined to produce an outstanding piece of tool room equipment that is also well suited to long and short production runs.

Simplicity of design permits an unusually low price. Parker Machine Company has these mills on hand for immediate delivery. Write or phone John Schleiffer at our Brooklyn headquarters for full information.

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AIR TURBINE TOOLS

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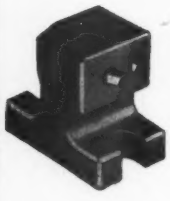
How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

Patents Pending

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.



The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:
3/16, ¼, 5/16, ⅜, 7/16, ½, ⅝, ¾, 1"

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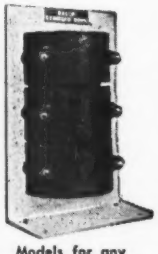
automatically "fans out" Steel Sheets for easier, faster, safer handling!



Models for any thickness to 3/16"

BASCO lifts the top sheet instantly — automatically raising and separating the next sheet for easy grasping.

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ALL GRADUATIONS ARE WELL-DEFINED BLACK LINES ON DULL CHROME SURFACE WHICH MEANS EASIER AND SURER READING, EVEN IN POOR LIGHT.

GUARANTEED ACCURATE WITHIN ONE HALF OF A TEN THOUSANDTH OF AN INCH.

THE CHROME SURFACE IS EXTREMELY HARD AND NON-PEELING. IT PROTECTS THE TOOL INDEFINITELY FROM RUST AND DISCOLORATION.

DROP-FORGED MODEL WITH CHROME FINISHED MICROMETER HEAD, 10th VERNIER, FROM $9.25 up.

No. 901 C 0-1" size with LOCK NUT and RATCHET and 10th vernier as shown

$13.25

This tool with TUNGSTEN CARBIDE tipped anvils

$15.75

Dealers! Here's a real profitable line

ASK FOR CATALOG ON OUR COMPLETE LINE OF MICROMETERS IN ALL SIZES.

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COMPLETE LINE OF PRECISION INSTRUMENTS
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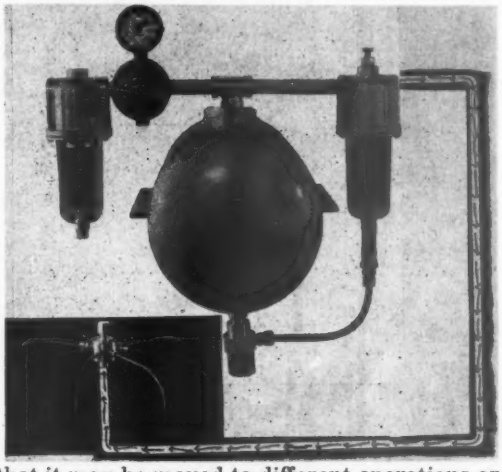
CIRCLE INFORM-A-GRAM KEY NO. 112D

Now in Full Production—

Tool Cooling System Operates on Principle of Gas Refrigeration

A tool cooling and lubricating unit that operates on the expansion-cooling of gas refrigeration principle has been developed by the Air Conversion Research Corp., 4107 North Damen Ave., Chicago 18, Ill.

It is called the Acro Lo-Jet coolant system and is designed to accommodate up to 16 cutting operations. The unit, also, is portable so



that it may be moved to different operations or positions for changing work demands.

Besides being effective on multiplying tool life, the Lo-Jet permits taking fuller cuts on any project. In addition to the mechanical production advantages, the coolant system eliminates such problems as objectionable odor and smoke.

Here is how the cooling and lubricating unit works:

Acro Coolant is forced in a high velocity air stream where it is atomized into a fine mist. It is then directed to the tool through the Centrifugal Distributor (lower left) flexible high pressure tubing and nozzle. The Acro-Coolant solution is cooled below room temperature and cools the tool; the jet action carries away tool heat and keeps chips out of the way.

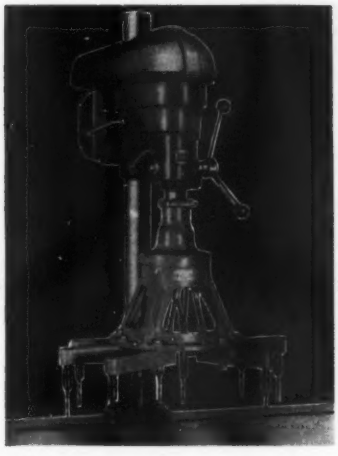
Circle Inform-A-Gram Key No. D5.

Improved Electron Drill Seen at Metals Show

One of the many outstanding new developments exhibited at last month's 35th National Metal Exposition in Cleveland, was a measurably improved electron drill—now known as the Elox M-400 Electrical Discharge Machine Tool.

The new machine features many improvements over the older M-300, greatly increasing the versatility and accuracy of this type of

. . . *Continued on page 117*



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DRILL PRESSES

Handle jobs and drill holes of a size no one could attempt on other 15-inch or 14-inch drill presses, as for example this multiple hole job with an 8-spindle head attachment. Helmet Heads will stand up for many extra years under toughest service conditions.

The 15-inch Drill Presses with 5/8-inch capacity, not just the ½-inch capacity of light 15 and 14-inch machines.

Real precision at the chuck—where it counts, is guaranteed by the 50% thicker column (3/16" walls).

Up to 50% more wear resistance against accuracy destroying side thrust through a longer, and 20% larger quill (2-1/16" dia.). This pays off on deep hole drilling and routing. 4 inches or more of the quill is always anchored within the head.

Rugged steel 6-tooth, involute-shaped, splined drive sleeve. 5 speeds (25% greater range). Belt tension release for easy speed changes.

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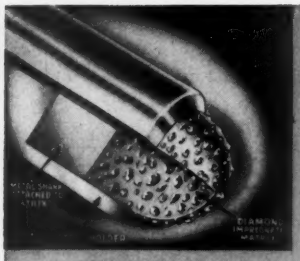

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- Diamond Powder—its Production and Use
- Polishing Gem Stones for Jewelry
- Manufacture of Watch and Instrument Jewels
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Positive grip on undersize, oversize or standard diameter work! Patented coordinate cams eliminate fingers.
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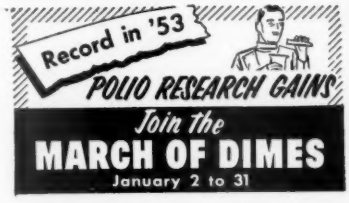
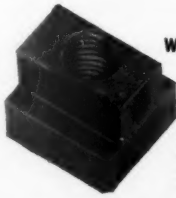
CIRCLE INFORM-A-GRAM KEY NO. 114C





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WIDE RANGE OF 16 SIZES

⅜" to 1⅛"

For table slots and cross slides on machine tools, cyanide hardened. Write for catalog on full line of tool and shop accessories.

TIETZMANN TOOL CORP.

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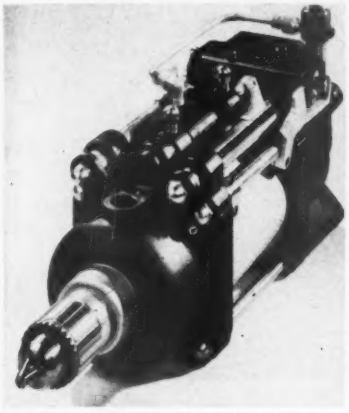
CIRCLE INFORM-A-GRAM KEY NO. 114D

Automatic Air Drill Does Single, Multiple Feed Rate Operations

A drilling unit weighing only 30 lbs., but capable of performing single and multiple feed rate operations, is now being manufactured by Hause Engineering of Montpelier, Ohio. Powered by compressed air and hydraulically fed, the unit is suitable for automatic or manual cycle control.



The stroke is adjustable to 4" with ample thrust for ½" diameter drilling in steel. Positive stop with a dwell or instantaneous retract operation; continuous cycling; skip drilling, back feeding and manual jogging are easily achieved.

Rotary air motors that are available in a variety of capacities to ¾ hp and speeds of 500 to 15,000 rpm, give this drill unit (Model 14 Hause Holomatic) an extremely wide working range. The unit can be arranged to suit all requirements and can be mounted in horizontal, vertical or angular planes. Write to Hause Engineering. **Key No. D1.**

CARDload of Information

A new Stainless Slide Chart which is literally a "cardload" of information is being offered by the Carpenter Steel Co., 122 W. Bern St., Reading, Pa.

The chart gives such pertinent data as the relative workability for many grades of stainless steel and useful information for jobs where blanking, deep drawing, heading, machining, welding, etc., are required.

The slide chart also has a complete table of information on the physicals for the stainless grades. **Circle Key No. D2.**

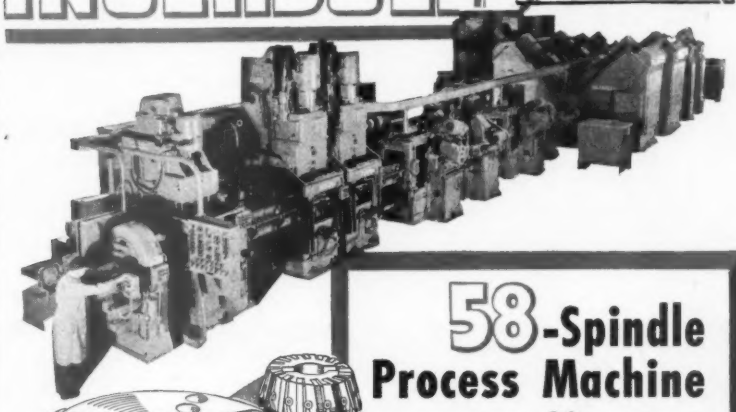
Indicating Snap Gage Aided By Easy Handle

Here is a snap gage with an easy, comfortable grip that gives it a maximum degree of sensitivity and accuracy.

This indicating gage is sturdily built for long life and maximum efficiency. Built-in compensation for wear insures accuracy of the instrument even after long periods of usage. Typical applications are measuring pitch diameters and O.D.'s on splines and gears and the measuring of the depth of keyways.

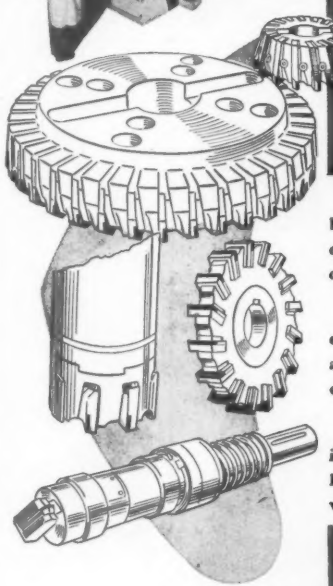
Foster Engrg. Corp., 4200 N. Woodward Ave., Royal Oak, Mich.
Circle Key No. D3

INGERSOLL'S NEWEST



58-Spindle Process Machine

MILLS AND BORES 90 AUTOMOBILE CYLINDER BLOCKS PER HOUR



Seven kinds of milling cutters, together with boring tools and chamfering bars, fixtures and transfer equipment, were built by Ingersoll as integral parts of the process line pictured above.

Working with our machine designers to meet exacting production and accuracy requirements of the automobile industry, Ingersoll's cutter engineers are continually improving basic tool designs.

Application of these advances to our standard inserted blade cutters makes higher feeds, longer tool life, and increased production available for all kinds of work on all makes of milling and boring equipment.

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NEW INGERSOLL
Cutter Catalog 60 H

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILLINOIS, U. S. A.

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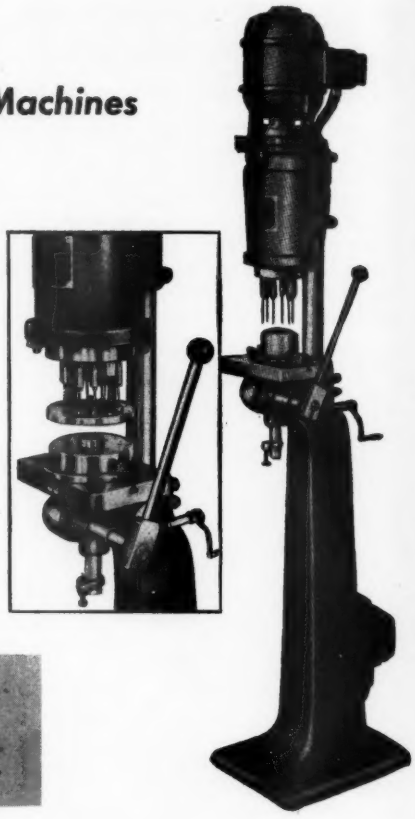
Multi-Spindle Drilling and Tapping Machines

Available in Bench or Stand type



Widely used in the manufacture of electrical apparatus, small precision parts, and particularly useful in the optical and clock industries . . . Preferred because careful construction and quality materials result in extremely accurate performance!

Precision work is guaranteed by the use of hardened drill guides. For tapping operations an automatic switch is fitted to reverse the spindles at a predetermined point so that tapping depth is accurately held.

PARTIAL SPECIFICATIONS

Drill stroke	1½"
Spindle speeds	355-1400 rpm
Max. drilling dia.	4⅛"
Motor	⅔ HP

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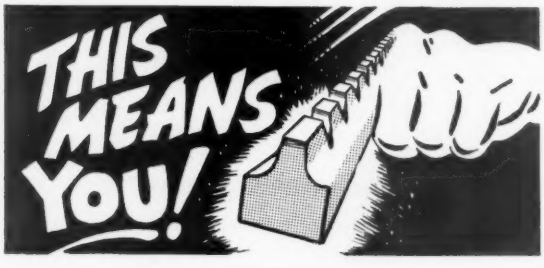

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You can cut
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in bores from 1/4" to 3"
in gears, milling cutters, pulley hubs, collars, couplings, etc., etc.

IN ONE MINUTE
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Maintain steady production
"reduce down time"
No Trick to it!

With Procunier Tapping Heads

Whether it's light, medium, or heavy tapping, for short or *long* periods Procunier Tappers are performing with a new found ease, a more dependable and consistent accuracy and providing many extra hours of tapping efficiency. They maintain quality and reduce spoilage and breakage to a minimum.

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Procunier
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. . . Electron Drill, from page 113

equipment. Both cutting and grinding effects can be obtained.

A completely new sealed type of power pack is a major feature of the M-400. This unit was specifically engineered for precision tool and die work and will, with extreme accuracy, drill

Courtesy Elox Corp. of Michigan

both round and shaped holes in cemented carbide, other ultra-hard metals, or regular tool steels.

Greatly improved surface finishes, reduced machining time, and close dimensional control —together with important saving in diamond consumption—should enable certain classes of tool and die work to be performed at considerably reduced cost. The M-400 has been job-tested in the Detroit precision die market, where it has been successfully used in various "die sinking" operations on carbide extrusion dies, cold header dies, and blanking dies.

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An automatic gaging machine for 100% precision inspection of mass produced ammunition at the rate of 3600 rounds per hour is a recent development of a leading Ohio gaging instrument manufacturer. It is used to simultaneously inspect profile and alignment, head to shoulder dimension, overall length, extractor groove, primer depth, head diameter and head thickness of a complete round of 30 cal. armor piercing ammunition. At the same time rounds are automatically segregated into four classes including acceptable and rejects on dimensions, overweight and underweight. The pneumatic weighing device is an exclusive new design of unusual efficiency.

The machine is push button operated and an unskilled and inexperienced operator needs only to place cartridges in the hopper. There are only two gaging stations and a few simple, short mechanical movements. The cartridge feeds from the hopper into a split-chamber

. . . Continued on page 123

THERE'S A STURDY
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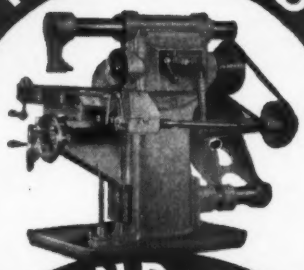
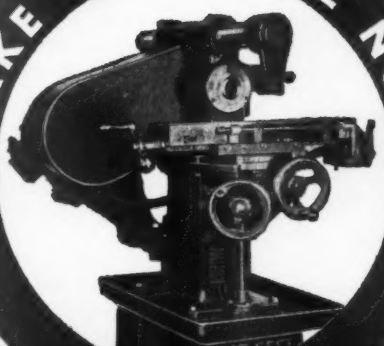
FOR EVERY PURPOSE
Thousands of efficient, low cost Burke Bench Millers are proving their superiority in Tool, Development and School Shops and a wide variety of mass production operations.

BURKE POWER FEED NO. 4



BURKE HAND FEED NO. 3

BURKE UNIVERSAL NO. 4



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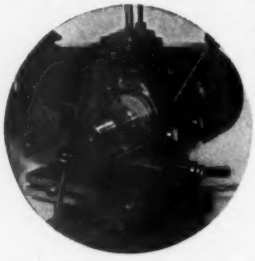

Slotting with our Standard Stub Arbor and low speed spindle drive.

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The Barker Mill has been tried and proved in a wide variety of industries throughout the country. It is ideal for a big assortment of small parts jobs that ordinarily tie up large expensive machines.

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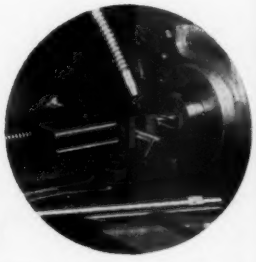

Milling flat on ½" diameter steel shaft with standard ½" end mill. Using up and down head movement.

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A Standard Machine Designed for Variety Production

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Any number of drilling units up to eight may be employed, the units being movable not only through 360 degrees on the circular table but also movable endwise on riser plates to meet the requirements of the part being drilled.

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If you are interested in reducing the cost of your radial drilling and tapping operations, write for price and dimensional data.

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SCREW MACHINE PRODUCTS

The contract production and processing of precision screw machine products, parts and assemblies is the theme of a brochure now available from Z & W Machine Products, Inc. Included are photos and scale drawings.
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JIG & FIXTURE PARTS

This manual published by Standard Parts Co. presents a complete and useful line of jig and fixture parts available to the tool industry. Over 500 tool components are included in this practical catalog.
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SURFACE ROUGHNESS

A bulletin on how to win arguments on surface roughness is available from the Micrometrical Mfg. Co. Basic reasons why production people often argue and disagree about how rough a given machined or finished surface is are presented.
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METAL FABRICATING

The various types of sheet steel and aluminum cabinets and enclosures fabricated by Danco Metal Products, Inc. are presented in a new bulletin put out by the firm. Cabs for power shovels, X-ray cabinets and instrument panels are discussed.
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DUST, FUME ELIMINATORS

Two new Centri-Merge Vertical Rotor wet type dust and fume eliminators are described in Bulletin VU 8-53 issued by Schmieg Industries, Inc. The units are being offered for industrial use for the first time.
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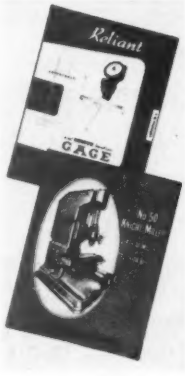

RELIANT GAGES

Adjustable depth and groove location gages are illustrated and described in the Reliant Industries Catalog 53-B. Specifications and dimensions of several types of the measuring instruments are given.
Circle Inform-A-Gram No. E7

MILLING AND BORING

The W. B. Knight Machinery Co. presents a Quick-Pic Catalog on its No. 50 vertical milling and precision boring machine. Among the illustrations in this brochure is a cross-sectional drawing showing the construction features of the Knight machine.
Circle Inform-A-Gram No. E8

CORRECT CHEMICALS

Klem Chemicals, Inc., has a new catalog available for use by metal processors and finishers to aid in selecting correct chemicals for various operations. A comprehensive chart is included.
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SINTERED METAL PARTS

Gramix part and bearings are made from compacted and sintered metal powders, and offer the strength and toughness of machined parts plus high wear resistance. The U. S. Graphite Co. offers an illustrated catalog describing the products.
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CONTROL VALVES

A new condensed catalog, No. 531, just issued by C. B. Hunt & Son, describes the firm's line of air and hydraulic control valves and valve couplings. Sectional views of body, plunger, packing and interior operation are shown.
Circle Inform-A-Gram No. E11

BELT CONVEYOR IDLERS

More than 500 belt conveyor idlers in 34 types are pictured and described in a 48-page booklet, No. 2416, available from the Link-Belt Company.
Circle Inform-A-Gram No. E12

METAL CUTTING SAW

The new, improved Hydra-Cut Hydraulic metal cutting saw made by the Peerless Machine Co. is described in a brochure just released by the firm. A pictorial idea of the features of this machine is presented.
Circle Inform-A-Gram No. E13

SPECIAL FACILITIES

This general facilities brochure provides a comprehensive picture of the precision equipment and skilled help utilized by the Hartford Special Machinery Co. in building their automatic drilling and tapping machines, automatic thread rollers, and jig fixture indexing devices.
Circle Inform-A-Gram No. E14

REMOTE VALVE CONTROL

Flexible shafting for the remote control of valves is the subject of a new 16-page design manual available from the Stow Mfg. Co. Featured is a chart for the selection of the correct size flexible shaft for any valve remote control problem.
Circle Inform-A-Gram No. E15

GEAR TESTERS

How gear testers are used and the various types available are the subjects of an illustrated brochure being distributed by the George Scherr Co. Diagrams and illustrations aid in explaining the units.
Circle Inform-A-Gram No. E16

. . . Precision Switches, from page 66

Fig. 6. Switches are installed in a die which swages discs of silver into base metal backing for electrical contacts. Each die operation is monitored at every stroke and the press instantly stopped if there is failure of advance of either the strip material or the silver stock. Check is made to determine that guide holes have been properly punched and freed from slugs. In case of stoppage, pilot lights indicate which station is in trouble.

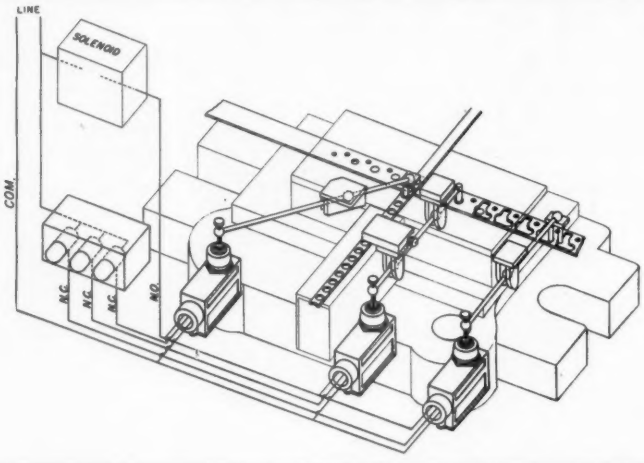

Figure 6 shows a unique press die where built-in switches stop the press if strip or stock fails to advance.

On the surface grinder (Fig. 7), a normally open, sealed die-cast switch is wired into the power circuit ahead of the motor-starting switch. When the lever control for the permanent magnet chuck is in the "on" position, an arm on the lower shaft actuates the switch which completes the circuit to the motor-starting switch. This prevents the operator from starting the motors with work on the chuck but without having first turned on the magnetic chuck.

On the press (Fig. 8), two splashproof switches with hand plates must both be actuated at the same time or the ram will not operate. This method of ensuring operator safety is faster and less annoying than some other commonly used press safety devices.

Table II shows a wide variety of applications on which switches have been successfully used. In the upper row, second from the right, is a position indicating device employing standard panel mounting type actuators with "pin" plunger switches. This arrangement has many applications in gaging, sorting, or position indicating. Switches may be staggered according to high and low limits, and pilot lights or other annunciators connected into the circuits to show relative location of the actuating force.

The first sketch in the second row, Table II, shows the use of adjustable cams on a reciprocating rod to actuate control switches. A similar application in the next sketch is for

. . . Continued on page 124

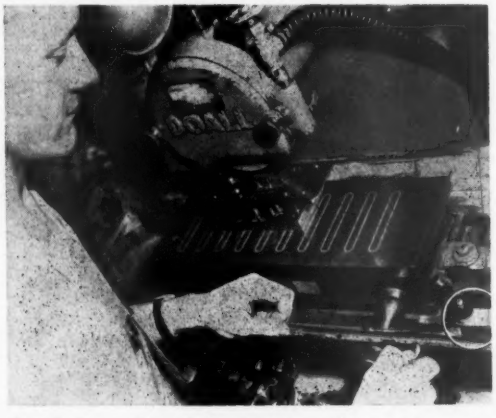

Fig. 7. Prevention of damage to machine or to stock is a primary function of this switch.

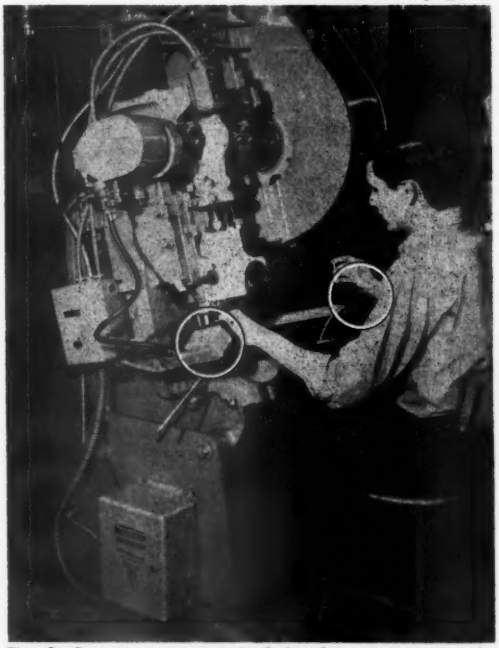

Fig. 8. Operator must use both hands to operate switches, actuating the press.

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2-SPINDLE
ADJUSTABLE
DRILLING
HEAD

Drills, taps metal, wood, plastics. 2-minute setup on most drill presses; quick, accurate adjustment. Variety of models, ½" to 12⅝" centers.

The drill spindles are held rigidly in position when two nuts are tightened. Sturdily constructed. Suitable for adaptation to large or small drill presses. Models A and B made with sleeve. Models C and D with overarm adaptation, equipped with guide pins, springs and brackets, mounted to a cast-iron base with surfaces ground for use of drill fixtures. All models can be used for drilling or tapping on tapping machine or drill press with reversible spindle. Also used with standard tapping heads.

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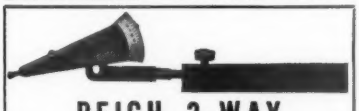

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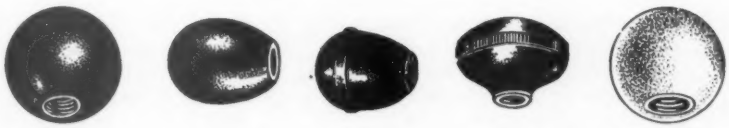

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These are designed for machine tools, jigs, fixtures, shift lever handles, etc. and give your product that "dressed up" appearance. Made in a wide variety of diameters and thread sizes. Steel ball handles are turned from bar stock. Highly polished. Low prices and the finest quality.

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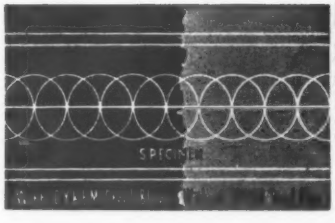

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Stops Losses in Making Dies and Templates
Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.
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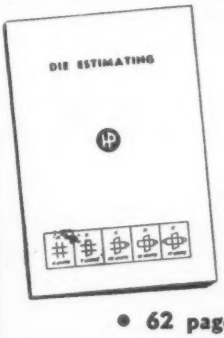

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- **26 time value tables**
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compare YOUR drill fixture COSTS with ANCHOR BUSHING templates

Anchor Bushing drill templates, using sheet metal or laminate plastic materials, are made flat or in compound curved forms at a fraction of cost and time required for similar conventional drill fixtures.

Your TOOLING COSTS are reduced in simplified design and fabricating methods. Your MATERIAL DOLLARS go further by using inexpensive hardened steel Anchor Bushings and sheet metal or plastic materials. Your PRODUCTION JOB TIME is conserved since lightweight Anchor Bushing templates reduce worker fatigue and storage problems.

Compare your drill tooling methods, as have leading aircraft tooling departments, with the Anchor Bushing Method.

Ask today for our Anchor Bushing Catalog – it describes methods, bushing styles, sizes and prices.

Solar Aircraft Company, San Diego, craftsmen use contoured Anchor Bushing drill template on nacelle of Lockheed P2V Neptune aircraft.

Standard Anchor Bushings for rivet or spot weld attachment to sheet metal or fiberglas.

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THE *hi-shear* RIVET TOOL COMPANY

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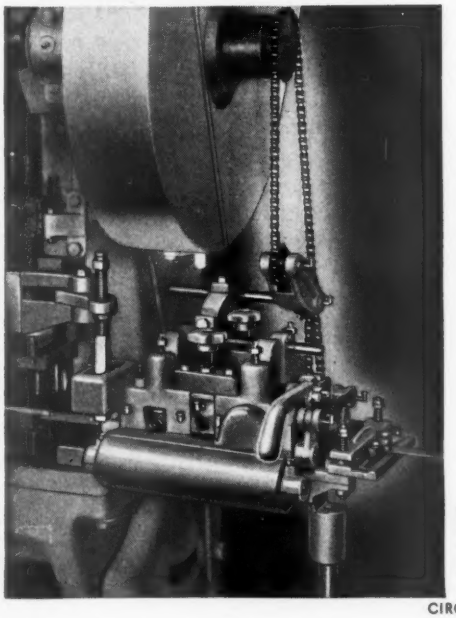
GET *RAPID-FIRE PRODUCTION from your PUNCH PRESSES*

IT'S EASY WITH **WITTEK Automatic Roll Feeds**



Step up production by making your punch presses automatic! Wittek automatic roll feeds fit all makes and sizes of punch presses — provide maximum efficiency and extreme accuracy in the high-speed automatic feeding of strip stock. They are made in single roll, double roll, and compound types with straighteners, in models to feed (push or pull) in any of four directions. Length of feed is quickly and easily adjusted to meet individual job requirements.

WITTEK Reels Stands

Simplify Handling of Coiled Stock

A choice of standard models is available to facilitate handling a large variety of coiled stock . . . from small, light coils to those weighing up to 800 pounds. These larger reel stands automatically center the coils and provide frictional braking action to prevent overrunning and maintain uniform coil slack.

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4474

WITTEK Manufacturing Co.

4323 W. 24th Place, Chicago 23, Illinois

Automatic ROLL FEEDS AND REEL STANDS

CIRCLE INFORM-A-GRAM KEY NO. 122B

... Ammunition, from page 117

gage station connected to Electrichek gage heads. Individual lights on the diagram panel — one for each dimension or condition — indicate whether acceptable or plus or minus. When the dimensions and weight are within

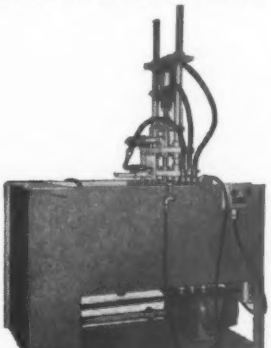
Photo courtesy Sheffield Corporation

tolerance the lights black out. If not, a red or clear light indicates a plus or minus condition respectively.

The machine is only 40" long, 30" wide, and 57" high and its compact size saves substantial floor space in installations where more than one unit is used. It occupies less than one-third the space of equipment it replaces.

New Machine Quenches Die Holes Automatically

In announcing its new I.D. Hole Quencher, the Palmer Mfg. Co., 3790 Ridge Rd., Cleveland 9, Ohio, reports this machine puts into a scientific and automatic cycle of operations all the factors concerning temperature of die, temperature of the coolant, timing of coolant exposure, etc.



With the new I.D. Hole Quencher, the heated dieblank is placed into position on the anvil; air operated rams contact above and below, holding a fitting tightly against the die. When hole quenching is completed, a kick-out ram automatically pushes blank into tank for overall cooling. All timing, temperature and pumping operations can be set on a predetermined cycle with push-button control. The hole quencher is adjustable to handle from 1/16" to 3" I.D. holes in blanks ¼" to 8" O.D. and from 1/16" to 6" long. **Circle D6.**

NEW ALPHA 100 TON DIE TRYOUT PRESS

YOU CAN [illegible] fit and finish both [illegible] punch WITHOUT REMOVING the DIE. "Tryouts" take less time because the press is open on all four sides, giving easy access to the die and punch. The head can be quickly released and rotated to any point up to 240°. This new press is compact, being 82" high and occupying only 75" x 84" of floor space. The rugged construction of the Alpha 100-ton die tryout press assures years of trouble-free service.

The top die in position for altering.

It's easy to work on the bottom die.

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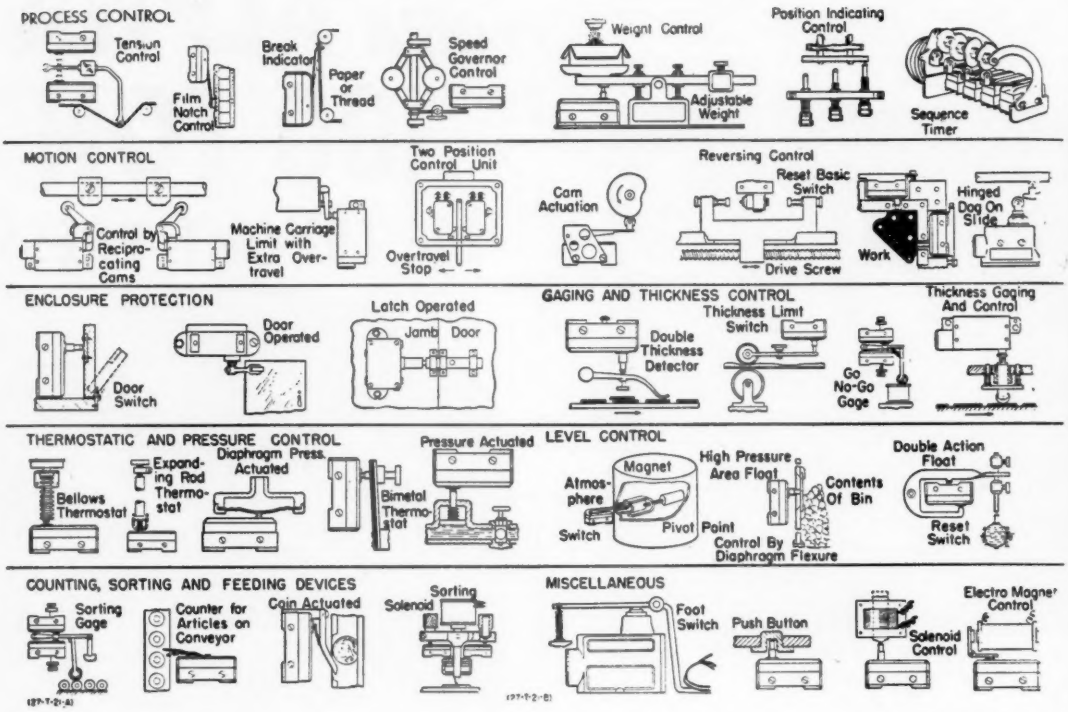
CIRCLE INFORM-A-GRAM KEY NO. 123

Table II—Typical Applications of Snap-Action Switches



Courtesy of INSTRUMENTATION

. . . Precision Switches, from page 120

a switch used to limit travel of a machine carriage. Additional overtravel is provided by using a spring-loaded actuating arm on the carriage.

The sketch second from the right in the second row is of switches arranged in a machine fixture so as to permit machine operation only after the work has been properly positioned. This is one of the most popular tooling applications for switches.

The fourth and last sketches in the third row indicate many possibilities. As a detector of unusual thickness of parts passing on a conveyor belt or slide, the switch can operate a reject signal or mechanism. One example of use would be on blanks being fed into a press, to prevent double thicknesses from entering the tooling area.

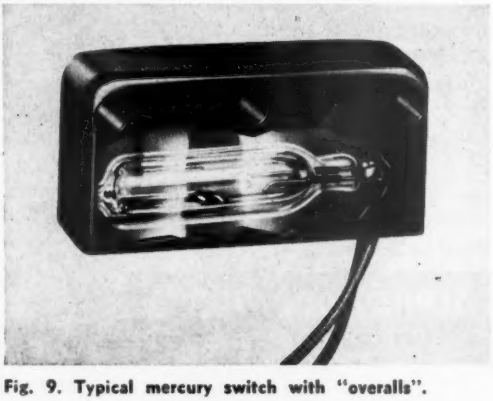


Fig. 9. Typical mercury switch with "overalls".

Mercury Switches

In addition to the precision snap-action switch, another very useful type of electrical switch is the mercury switch. This consists of a closed insulating tube to which are fused two or more electrodes. These are so positioned that as the tube is tilted from one position to another, a small amount of mercury sealed into the tube will move to close or open a circuit between the electrodes.

Hydrogen filled mercury tubes are often used in d-c applications to provide high interrupting capacity without the use of condensor networks.

Mercury tubes are mounted to the actuator object by means of simple spring clips. Additional safeguard is provided by wiring or cementing the tube to the clip. Or, the mercury tube may be enclosed in a plastic or metal housing (Fig. 9).

Proper sealing of lead wires to the electrodes on the mercury tube make it an ideal dust and oil proof switch for many industrial applications.

"Electrolimit" Measuring System Added to Jig Borers

The manufacturer of the No. 2E Jig Borer has added the Electrolimit measuring system to this series of jog borers. The new machine is designed for precision boring and milling work, making it the ideal tool room size. Featuring the Electrolimit measuring system and the preloaded ball roll quill, the 2E is capable of locating and machining to tenths.

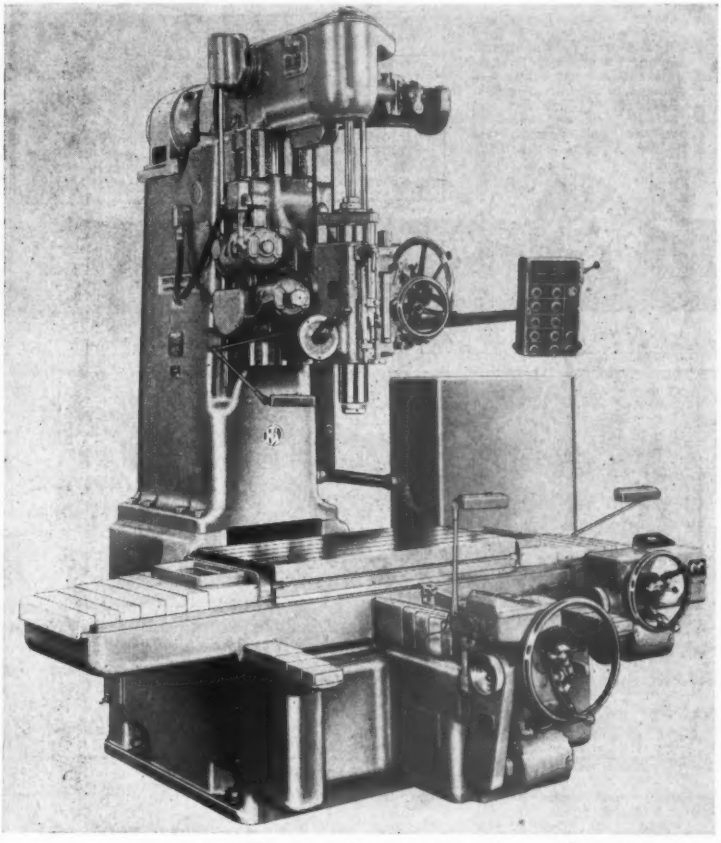


Photo Courtesy Pratt & Whitney, Division Niles-Bement Pond Company.

The No. 2E Jig Borer employs two separate Electrolimit measuring units, one for longitudinal and the other for transverse movements. Both measuring units are independent of traversing screws. Each unit obtains basic 1" spacings electromagnetically from a solid notched master bar and registers a zero reading on an indicating meter without making physical contact. Fractional inches are obtained by moving a small electromagnetic head by means of a superprecision micrometer head graduated for easy reading to .0001". Since a 1/32" movement of the 4½" diameter micrometer thimble represents a setting change of .0001", smaller estimated settings are possible.

The precision preloaded ball roll quill, unlike conventional sleeve bearings, "roll-feeds" on 288 precision balls preloaded between the hardened quill and liner with a total bearing pressure of 6,000 lb. The head bore is provided with a hardened and ground steel liner, deep frozen for assembly and precision lapped in place. The quill is hardened, precision ground and draw lapped for extreme accuracy and to "lay the surface pattern" in the direction of motion—essential to maintain permanent accuracy. The great stability of the ball roll quill makes milling feeds practical for the table and carriage, adding

. . . *Continued on page 165*

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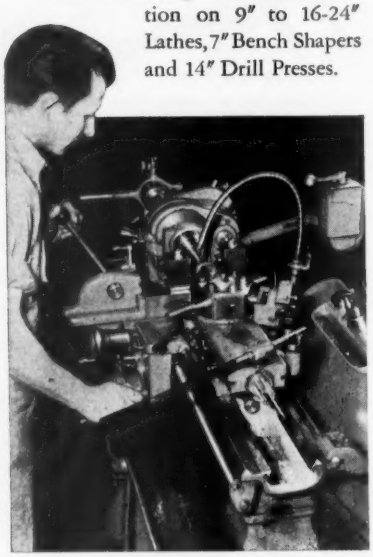

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Swing — 10⅛"; **Turret to Spindle** — 19⅜"; **Collet Capacity** — 1"; **Spindle Bore** — 1⅜"; **Spindle Speeds** — 12, 50 to 1357 r.p.m.; **Power Longitudinal Feeds** — 70, .0007" to .0836"; **Power Cross Feeds** — 70, .0003" to .0303"; **Thread Cutting Feeds** — 70, 4 to 480 per inch.

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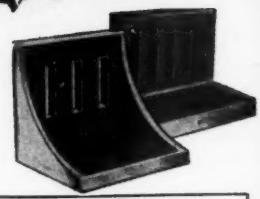

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#202	5.50	6"	5"	4½"	#302	7.75
#203	7.00	7"	5½"	4½"	#303	9.25
#204	9.00	8"	6"	5"	#304	11.50
#205	11.50	9"	7"	6"	#305	14.50
#206	17.00	10"	8"	6"	#306	18.50
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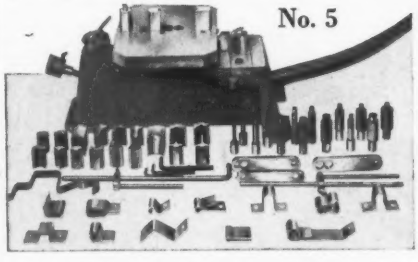

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. . . Metal Abrasives, from page 103

the results of the test more than any other single factor.

Continue with Abrasive Y until your plots show consistency and a slope of the plots can be made from which to calculate abrasive usage and machine hours. Having done so, and assuming you want to test Abrasive Z as well, repeat the process. Again, be sure to adjust your time cycle or blasting time to give the same degree of cleaning.

You will now have sufficient figures for three types of abrasives from which an evaluation can be made. Your delivered cost of the abrasives is easily found from your accounting records. Your accounting records will also yield a figure of machine cost per hour. This can be related to direct labor as a percentage of it, or to hours of operation of the machine. This standard cost should include power, plant services and space, general plant overhead, depreciation, etc. — sometimes called machine burden. Thus you will have a figure that will include direct labor and burden as a standard cost per machine hour. Repair costs should include both the cost of parts and maintenance labor. One fear in running a short test is that the repair costs are not truly representative of those to be expected for the abrasive being run at the time. The longer the test, the more reliable this figure.

Machine hours (i.e. time to clean) per ton of castings is a highly important factor and should be given full weight in evaluating one type of abrasive against another. Your method of accounting for machine burden may differ from another plant's, but some recognition should be taken of power and operating costs in direct relation to the hours that the machine was actually engaged in cleaning castings. One of the greatest cost savers in your cleaning operation is to run your machine the shortest possible time that will yield satisfactory cleaning for the type of abrasive being used.

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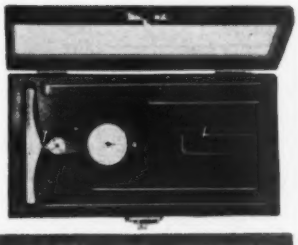

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The press tooling for producing the work-piece shown at the left of the accompanying illustration is representative of that which will be shown in operation by S. B. Whistler & Sons, Inc., at the National Metal Show in Cleveland in October.

The finished work-piece measures 23⅞" wide x 28¾" long. It contains a total of 28 square holes measuring .375" and 1 round hole .880" in diameter. Fifteen of these holes are pierced at three levels in the face of the piece at the same time that 14 square holes are being pierced in the formed down flanges.

Anyone experienced in die making and metal fabrication will recognize the unusual simplicity of this die and, to the time and cost conscious, the almost unlimited production and money saving possibilities through the use of this type of equipment.

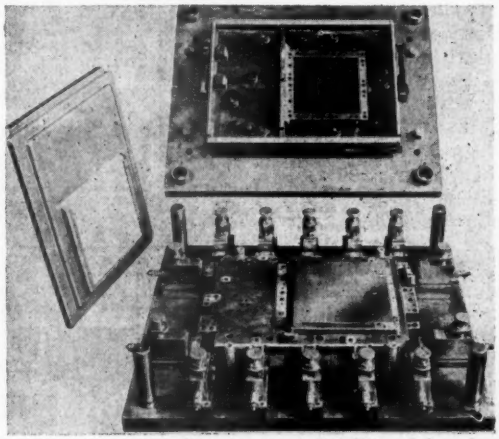


Photo courtesy S. B. Whistler & Sons, Inc.

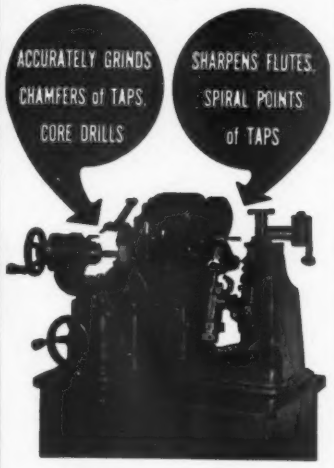
The die set for the job illustrated measured 36" x 43". The die is made up from Whistler standard stock sizes of punches and die bushings. The 90° holes are pierced by Whistler HU-50 90° Perforating Units also available from stock. The upper and lower die plates are jig bored and tapped to precision fit. Punches and die bushings are firmly held yet quickly removed right in the press for replacement if necessary.

This application of Whistler standard punches and bushings in combination with their 90° Perforating Units is typical of what can also be accomplished with other types of Whistler perforating die equipment.

For example, their adjustable punch and die units, for use with T-slotted die sets, and magnetic punch and die units, used with a template, both comprise re-usable punch and die parts. Each perforating job in the plant will benefit in one or more ways through the use of such parts or units in making up the die. For example, press production capacity can be held closer to maximum. Pieces in work frequently require less labor handling, fewer press operations.

. . . *Continued on page 160*

The Model 1100 Hybco Tap Grinder



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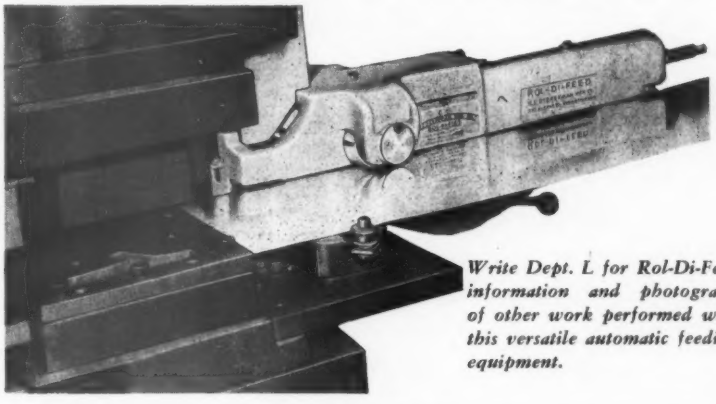

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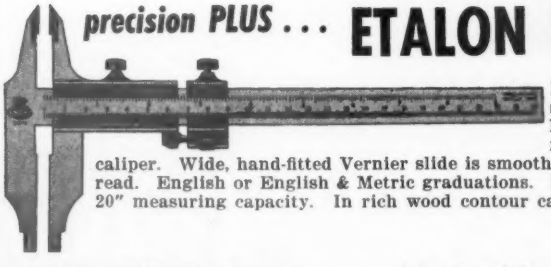

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7	24	40	75	91	108	116C	125C	134B	140A	145A	149E	155A	161A	169B
8	25	42	76	92	109	117	126A	134C	140B	145B	150A	155B	161B	169C
9	26	59	77	93	110	118A	126B	136A	140C	146	150B	156A	161C	171A
10	27	61	78	94	111	118B	126C	136B	141A	147A	150C	156B	161D	171B
12	28	63	79	95	112A	121A	126D	136C	141B	147B	150D	157A	162A	171C
13	29	65	80	96	112B	121B	127A	136D	141C	147C	151A	157B	162B	171D
14	30	66.1	81	97	112C	121C	127B	137A	142A	147D	151B	158A	163A	173
15	31	66.2A	82	98	112D	121D	128A	137B	142B	147E	151C	158B	163B	174
16	32	66.2B	83	100	113	121E	128B	137C	142C	147F	152A	158C	163C	
17	33	67	84	101	114A	121F	129A	138A	142D	147G	152B	158D	164	

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2	19	35	69	86	103	114C	122A	129C	138C	143B	148B	153	159A	165B
3	20	36	70	87	104	114D	122B	129D	138D	144A	149A	154A	159B	167A
4	21	37	71	88	105	115	123	130	138E	144B	149B	154B	159C	167B
5	22	38	73	89	106	116A	125A	133	138F	144C	149C	154C	160A	168
6	23	39	74	90	107	116B	125B	134A	139	144D	149D	154D	160B	169A
7	24	40	75	91	108	116C	125C	134B	140A	145A	149E	155A	161A	169B
8	25	42	76	92	109	117	126A	134C	140B	145B	150A	155B	161B	169C
9	26	59	77	93	110	118A	126B	136A	140C	146	150B	156A	161C	171A
10	27	61	78	94	111	118B	126C	136B	141A	147A	150C	156B	161D	171B
12	28	63	79	95	112A	121A	126D	136C	141B	147B	150D	157A	162A	171C
13	29	65	80	96	112B	121B	127A	136D	141C	147C	151A	157B	162B	171D
14	30	66.1	81	97	112C	121C	127B	137A	142A	147D	151B	158A	163A	173
15	31	66.2A	82	98	112D	121D	128A	137B	142B	147E	151C	158B	163B	174
16	32	66.2B	83	100	113	121E	128B	137C	143C	147F	152A	158C	163C	
17	33	67	84	101	114A	121F	129A	138A	142D	147G	152B	158D	164	

INFORM-A-GRAM

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A3	A15	A27	A39	A51	B10	B22	B34	B46	B58	B70	C2	D6	E9
A4	A16	A28	A40	A52	B11	B23	B35	B47	B59	B71	C3	D7	E10
A5	A17	A29	A41	A53	B12	B24	B36	B48	B60	B72	C4	D8	E11
A6	A18	A30	A42	B1	B13	B25	B37	B49	B61	B73	C5	D9	E12
A7	A19	A31	A43	B2	B14	B26	B38	B50	B62	B74	C6	E1	E13
A8	A20	A32	A44	B3	B15	B27	B39	B51	B63	B75	C7	E2	E14
A9	A21	A33	A45	B4	B16	B28	B40	B52	B64	B76	C8	E3	E15
A10	A22	A34	A46	B5	B17	B29	B41	B53	B65	B77	D1	E4	E16
A11	A23	A35	A47	B6	B18	B30	B42	B54	B66	B78	D2	E5	
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So You Want to Make a MILLION?

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1. Get CARMET carbide metal dies and equip your presses with them.
2. Make 1,000,000 small stampings a day with only *one* grind per day.
3. Save $56,907 annually by using Carmet, as shown in the following cost comparison:

WITH CARMET		WITH HI-CARBON, HI-CHROME	
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★ 260 Grinds per year	$14,560	★ 4,420 Grinds per year	$ 47,424
★ Diamond Wheel Cost per year	$ 792	★ Abrasive Wheel Cost per year	$ 2,085
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4. Make millions *more* precision pieces a year than you could with hi-carbon, hi-chrome dies!

Ask the Carmet representative to figure out the potential savings and increased production for you in terms of your own work. ● *Allegheny Ludlum Steel Corporation, Carmet Division, Wanda & Jarvis Avenues, Detroit 20, Michigan.*

For complete MODERN Tooling, call

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AL FINE TOOL STEELS SINCE 1854

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SOLID carbide for greater rigidity, increased accuracy

Superior grade of carbide assures longer tool life

Master-machined for greater concentricity, precision work

Operates efficiently at grinding wheel speeds

No down time for dressing — maintains size and shape

Most efficient tool for small hole finishing

Save 75%

of internal grinding time with

FORD

SOLID CARBIDE

Grinding Burs

Yes, in only one-fourth the production time required by use of mounted points, FORD solid carbide grinding burs will remove material hardened up to 68 RC. Save down time, tool cost. Ford carbide burs can be resharpened many times and still retain new-tool accuracy. Let us prove it. Write today.

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HSS ground cutters, rotary files and countersinks. CARBIDE cutters, end mills and grinding burs.

Get complete details plus operational data on over 300 Ford rotary tools in new Catalogue No. 207.

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M. A. FORD MFG. CO., INC.

Pioneers in rotary tools for more than 30 years

Davenport 1, Iowa

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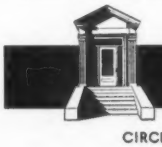
PATENTED

ANOTHER GRINDING ROOM PROBLEM SOLVED!

The small, precision-built machine you see above is the Radi-Form, a grinder attachment, that does almost everything but talk. The Radi-Form can move the work in a predetermined arc of any desired radius, from 1/16″ to 2″ concave, from .00 to 2″ convex, which means that radii can now be generated even on carbide tipped cutting tools in a matter of minutes, to within .0005 accuracy on a standard, unformed, cupped diamond wheel. You save headaches, time, and gain increased production. Write for literature and prices that will surprise you.



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Fast-Precision Tapping Made Easy!

✓ *Check These* **VIKING** FEATURES

- Cuts tapping time 80%
- Takes jobs up to 18″ in height
- Less breakage saves taps
- Needs only unskilled labor
- No vise necessary

The NEW Improved VIKING Tapper

Fast precision tapping made easy with the new Viking Tapper, unskilled help can tap more holes in less time—and the work is more accurate and uniform. For example, a perfect ¾″—10 hole can be tapped in ¾″ heavy tool steel in one minute. Saves taps too because there is far less breakage. In fact the saving on taps alone soon pays for the Viking Tapper.

Another important feature is extreme flexibility. Unique adjustable arm which can easily and quickly be raised or lowered, swung left or right, takes jobs up to 18″ in height and requires less resetting. Sliding parallel bars hold work—no vise needed. Quick changing adapters take only 5 seconds to change taps.

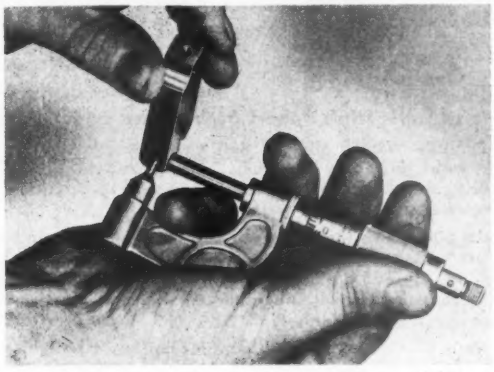
Stand or bench model. Adapters available in eight sizes. Write for full information. THE VIKING TOOL AND MACHINE CORP., 6 Main Street, Belleville 9, N.J.

CIRCLE INFORM-A-GRAM KEY NO. 134C

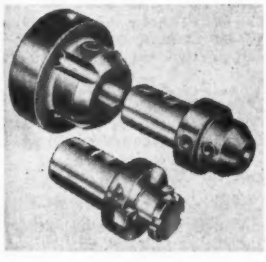
PROGRESS ON PARADE

NEW DEVELOPMENTS • IMPROVEMENTS • COST AND TIME SAVERS — Mail FREE Inform-A-Gram Card for MORE Details.

Hole Locator Micrometer. The exact location of a hole may be checked accurately and quickly with this new hole locator micrometer recently introduced by the



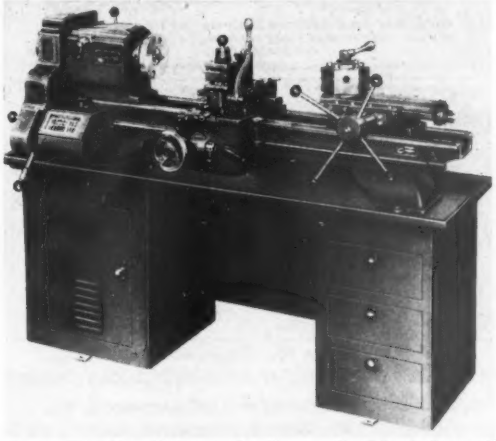
Tubular Micrometer Co., St. James, Minn. Other uses for this instrument include measuring the thicknesses of tubing, slots, grooves, etc. Additional information available upon request. **Circle Inform-A-Gram No. A1.**



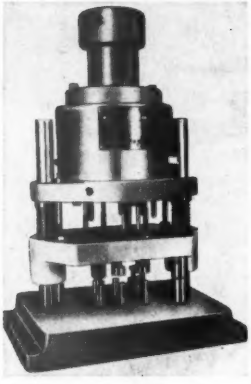
End Mill Adapter. A free catalog is available on the new style heavy duty end mill adapter and auxiliary equipment developed by Goddard & Goddard Co., 12280 Burt Rd., Detroit 23, Mich. This heavy duty adapter holds 2" straight shank end mills.

Circle No. A2.

Precision Lathes. This Clausing 1" collet capacity lathe is a heavy duty precision tool designed for efficient handling of every lathe operation within its ca-

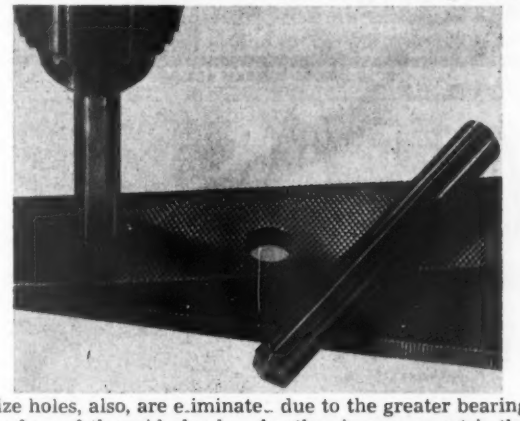


pacity. Specifications and other valuable information on this and other 12" lathes are presented in an illustrated brochure prepared by the Clausing Division of the Atlas Press Co., Kalamazoo, Mich.
Circle Inform-A-Gram No. A3.



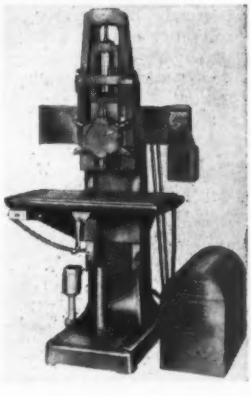
Self-Clamping Drill Jigs. Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio has designed a complete new line of self-clamping drill jigs to be used in conjunction with their gearless multiple spindle drill heads. These jigs can be used with drill heads to do drilling, reaming and tapping work on standard drill presses and tapping machines. Four distinct types accommodate various sizes of work pieces, handling hole patterns from 3" to 15" in diameter. **No. A4.**

Drills Through Files. An improved tool for drilling hardened steel up to 68 Rockwell without annealing has been announced by the Tempered Steel Drill Co., 3610 Superior Ave.. Cleveland, Ohio. One feature of this drill is the 3 wide lands, which keeps it from floating. Over-



size holes, also, are eliminated due to the greater bearing surface of the wide lands. Another improvement is the heavy center section that overcomes drill breakage, due to the pressure required when drilling hardened steel. Any standard drill press can use the new Tempered Steel drill. **Circle Inform-A-Gram No. A5.**

Automatic Turret Drill. The outstanding feature of the new Burgmaster Model 2BH 6-Spindle Automatic Turret Drill is the infinitely variable hydraulic feed which can be manually controlled for automatic operations. This allows one man to operate one or more machines at a time. For complete information on additional features of this drill write to Burg Tool Mfg. Co., 3743 Durango Ave., Los Angeles 34, Calif.
Circle No. A6.



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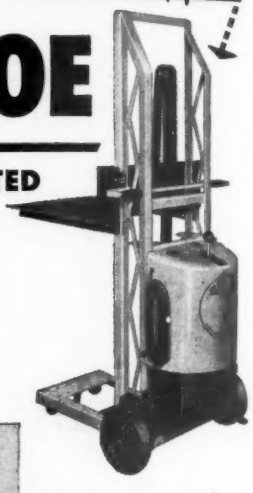

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Tool Capacity 750 lbs. Prices from **$236.50**

Distributors in Principal Cities

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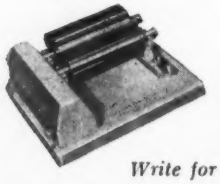
the NEW 24 inch SPITFIRE FLAT LAPPING MACHINE

LOW COST PRECISION LAPPING AT PRODUCTION SPEED

A NEW, large size Flat Lapping Machine of improved design for precision lapping of any material where a perfectly flat surface is necessary. Extremely close tolerance finishes are possible. An ideal machine for producing mating surfaces of sliding and rotating parts of air and liquid tight seals, plastic and die casting molds.



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For lapping cylinders to accurate, mirror-like finishes in less time than any other method. Saves up to ⅔ time in lapping.

Write for Brochures, Prices and Delivery

SPITFIRE TOOL COMPANY

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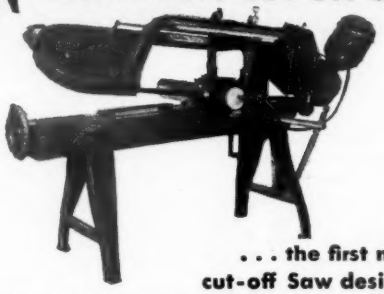
NEW THE WELLS MODEL 800 HEAVY-DUTY CUT-OFF SAW



. . . the first metal cut-off Saw designed for use with High Speed Steel Band Saw Blades

THE NEW WELLS MODEL 800, engineered to use blades 1" in width, is a heavy duty, metal cutting band saw designed to bring new accuracy and efficiency to your production cut-off operations.

Model 800 is also the first metal cutting band saw approved for use with high speed steel band saw blades. When used with this type of blade, a higher level of cutting efficiency has been attained in cutting stainless steel, die blocks and other tough metals.

See your Wells dealer for further information or write direct

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WELLS MANUFACTURING CORPORATION
1940 CEDAR ST., THREE RIVERS, MICH.

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Severance Regrinding Service

RECONDITIONING TO NEW-TOOL PERFORMANCE AT A FRACTION OF NEW TOOL COST!

☆ HIGH SPEED and CARBIDE ☆

Why take less?--for Safety, Efficiency, Economy--insist on genuine factory reconditioning service performed by Severance New Tool Craftsmen!

CONSERVE CARBIDE TOOLING

THIS BEFORE AND AFTER PICTURE SHOWS WHAT OUR NEW-TOOL CRAFTSMEN CAN ACTUALLY DO WITH YOUR BATTERED CARBIDE TOOLS OF THIS AND SIMILAR TYPES

CONSERVE THROUGH REGRINDING

REPRESENTS A NEW SEVERANCE MIDGET MILL (HIGH SPEED OR CARBIDE)

REPRESENTS THE SAME TOOL AFTER 20 REGRINDS

YOUR DULL CUTTERS ARE REGROUND BY SEVERANCE NEW-TOOL CRAFTSMEN

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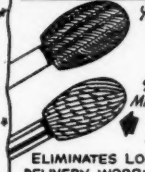


YOUR DULL ROTARY FILES can be ground into MIDGET MILL TYPE TOOLS LIKE THIS

ELIMINATES LONG DELIVERY WORRIES--Saves Your Dollars!

We're the Originators

OVER 20 YEARS EXPERIENCE IN THIS MONEY SAVING SERVICE

★ We've been copied but not surpassed ★

DEPENDABLE DELIVERIES ARE ASSURED ★ THROUGH SEVERANCE REGRINDING SERVICE

We Regrind: MIDGET MILLS, ROTARY FILES, BURS, FILE BANDS, COUNTERBORES, COUNTERSHANKS, ETC.

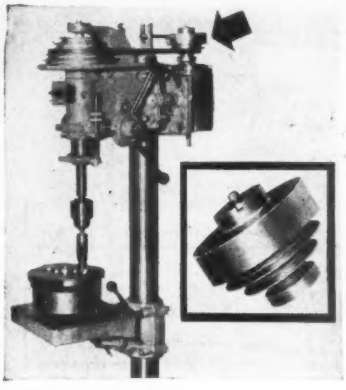
SEND YOUR DULL CUTTERS TO

SEVERANCE TOOL INDUSTRIES INC.
730 IOWA AVE., SAGINAW, MICH.

Catalog Including Regrind Prices Sent on Request.

CIRCLE INFORM-A-GRAM KEY NO. 136D

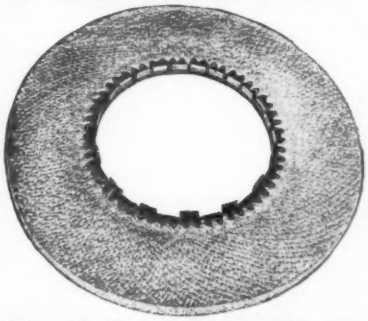
SPEED REDUCING PULLEYS now are being made in three models, making it possible to drill efficiently up to 1⅜" in steel on light drill presses with only ½



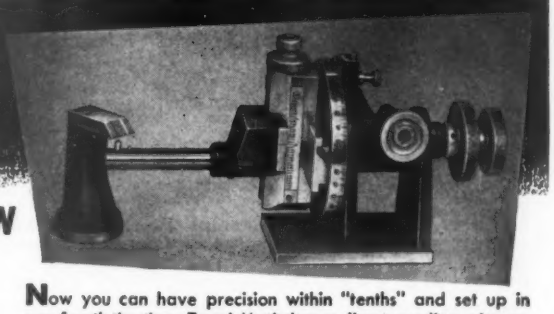
hp motor. Produced by the Pull-Gear Co., 4118 E. 8 Mile Rd., Detroit 34, Mich., the new pulleys are provided with reducing sleeves so they may be transferred to various machines with different motor shaft sizes.
Circle Inform-A-Gram No. A7.

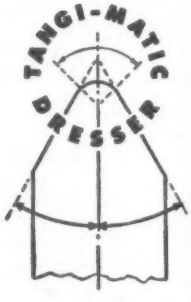
Hole-Punching. This illustration shows the results of a new multiple hole-punching process for stampings as developed by Federal Tool Mfg. Co., 3640 Alabama Ave., St. Louis Park, Minneapolis 16, Minn. Multiple holes of varying diameters can be punched simultaneously from any stampable material. Federal's new method reduces press runs with consequent time and labor savings making possible lower cost short run stampings that involve hole-punching operations.
Circle Inform-A-Gram No. A8.

"PERMANIZING," a new, exclusive manufacturing process, will double the life of a buff, reports the American Buff Co., 2414 S. La Salle St., Chicago 16, Ill. This process permanently locks together the fibres of the top-grade sisal fibre cloth woven to exact specifications and bias cut. It reduces fraying, prevents excess hardness, gives a perfect finish and eliminates many grease wheel operations.
Circle Inform-A-Gram No. A9.



Set Up Angle-Tangent-to-Radius Forms
IN MINUTES
with the NEW





Now you can have precision within "tenths" and set up in *one-fourth* the time. Tangi-Matic has a direct-reading micrometer *built in*, eliminating "mikes", height gages, Jo Blocks *and errors*. Even novice operators obtain extreme accuracy. Tangi-Matic dresses any concave radius down to .032", full 180° with equipment we give you. Set-ups can now be made without removing dresser from your grinder chuck.

Our new model has *removable dressing arm*, permitting the use of extensions for dressing *large wheels*. Wearing surfaces are hardened, ground and lapped to a mirror finish, assuring you of years of extra service over ordinary dressers. Lead screw is hardened and ground to extreme tolerances. Furnished complete with master setting block, small radius attachment, plastic hood and carrying case. Write for literature and name of representative in your area.

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DUSTKOP
Available from stock of 22 standard models.
300 cfm to 10,000 cfm
Ask for Catalog 605-2. Describe dust problem for recommendation by return mail—No Obligations.
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HARDENED and GROUND HSS BLANKS
Any decimal diameter to ½"—in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.
Write or Phone ORange 3-4301 for price list D-3
WILLIAM T. HUTCHINSON COMPANY
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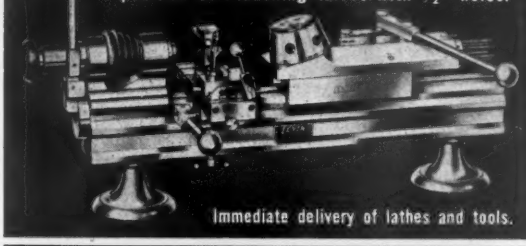
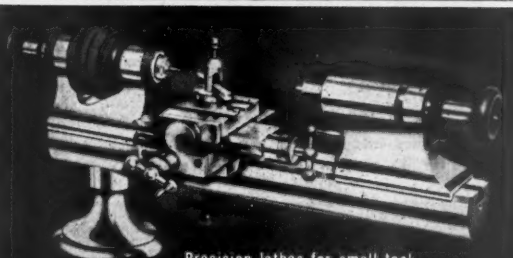
CIRCLE INFORM-A-GRAM KEY NO. 137C



Collet capacity 5/16" or 3/8", swing 4", bed 18" long, 6 position self-indexing turret with 1/2" holes.

Immediate delivery of lathes and tools.

LEVIN Jewelers type lathes for fine instrument work and second operations. Collets as small as .004". Send for catalog. Louis Levin & Son, Inc., 782 E. Pico Blvd., Los Angeles 21.



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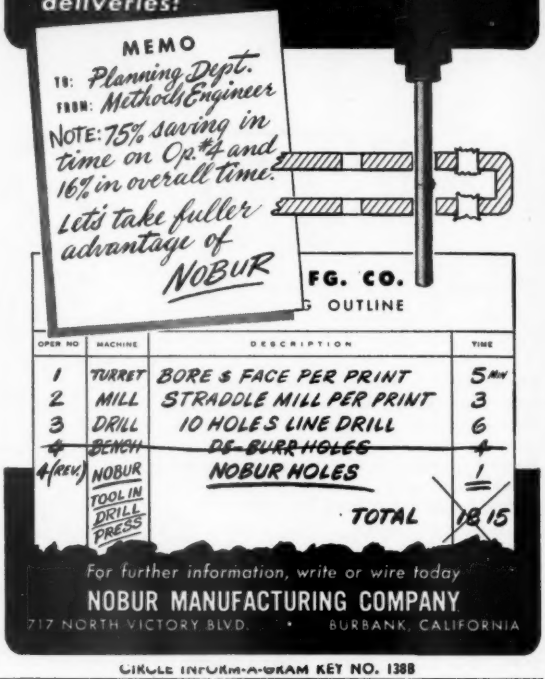
on drill press reduces production costs . . . speeds deliveries!


MEMO
TO: Planning Dept.
FROM: Methods Engineer
NOTE: 75% saving in time on Op. #4 and 16% in overall time.
Let's take fuller advantage of NOBUR
FG. CO.
OUTLINE
OPER NO | MACHINE | DESCRIPTION | TIME
1 | TURRET | BORE & FACE PER PRINT | 5 MIN
2 | MILL | STRADDLE MILL PER PRINT | 3
3 | DRILL | 10 HOLES LINE DRILL | 6
4 | BENCH | DE-BURR HOLES | 4
4 (REV.) | NOBUR TOOL IN DRILL PRESS | NOBUR HOLES | 1
TOTAL 18.15

For further information, write or wire today

NOBUR MANUFACTURING COMPANY

717 NORTH VICTORY BLVD. • BURBANK, CALIFORNIA

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RING PUNCHES

HARD . . .
tough . . .
concentric . . .

Precision-made of both Carbon Vanadium and high carbon, high chrome steels. Available in a wide range of stock sizes from 1/32" to 1" point diameters in increments of 1/64" for immediate delivery. Decimal sizes to order for delivery within 48 hrs.

Button Dies

Ring Type or Press Fit Hole tapered to eliminate slug jamming. Sizes in stock to match punch sizes.

Write TODAY for your copy of handy data sheets covering specifications and prices; also name of distributor in your area.

Exclusive Distributor Wanted for the States of Washington and Texas

Ring Punch & Die Co.

108 FOOTE AVE., JAMESTOWN, N. Y.

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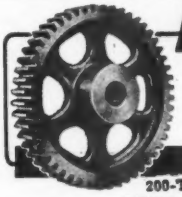

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CIRCLE INFORM-A-GRAM KEY NO. 138D

PALMGREN

ROTARY, INDEX, MILLING TABLE

No. 83

The only Table Having ROTARY FEED Combined With DUAL CROSS FEEDS!

This PALMGREN TABLE is sensational in price, construction and performance. Just what shops need for accurate, precision work. You can mill straight or curved, slot, drill, also rout, rabbet, mortise and sand on wood. Do hundreds of jobs as milling slots, grooves, keyways, squares, hexagons, curves, flats, dovetails, indexing and laying out work.

Designed for use on Drill Press or Milling Machine. It handles all types of metal and woodworking operations and makes your drill press a vertical milling machine. Precision built. It permits close tolerances. Rotary Feed is calibrated in degrees. Cross Feeds in thousandths. Cross slides and feeds are 2 1/4" each side of center—4 1/2" overall. Has Acme thread cross feed screws, adjustable gibs on cross slides—40 to 1 worm and gear ratio in rotary feed. 4 Bolt slots—2 lock screws.

No. 83 Table Dia. 8". T-Slots 5/8". Base Keyway 5/8", Base Dia. 6 1/4". Ht. 5". Wt. 37 lbs. Price only $54.50.

Now Only $54.50

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CIRCLE INFORM-A-GRAM KEY NO. 138E

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Oblique rays make scratches and defects stand out clearly.

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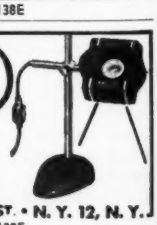
Heavy adjustable base.

Removable lens housing for inspection of large surfaces, engines, etc. . . .

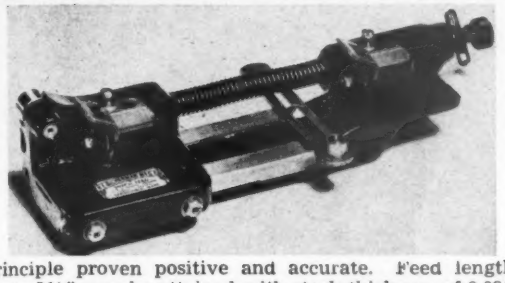


WRITE FOR ILLUSTRATED FOLDER

GEORGE SCHERR CO., Inc. • 200-T LAFAYETTE ST. • N. Y. 12, N. Y.

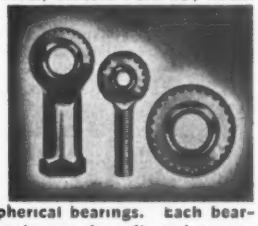
CIRCLE INFORM-A-GRAM KEY NO. 138F

New Hitch Feed. Featuring a new heavy, semi-steel main frame and moving member, as well as increased feed lengths, this hitch feed retains the gripper plate

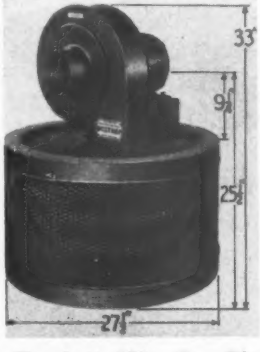


principle proven positive and accurate. Feed lengths up to 2½" may be attained with stock thickness of 0.031" maximum. Identified as the 2½" Model K Hitch Feed. Request catalog sheet K from the H. E. Dickerman Mfg. Co., 231 Albany St., Springfield, Mass. **No. A10.**

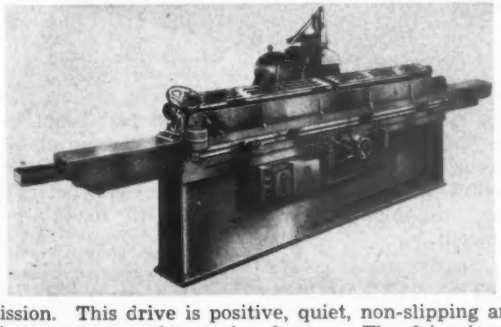
BEARINGS. A new line of spherical bearings and spherical rod end bearings has been introduced by Lincoln Park Industries, Inc., 1719 Ferris Ave., Lincoln Park 25, Mich. They provide a mean to adjust the ball race to provide thoroughly accurate positioning of the bearing. Maximum correction of misalignment and greater service life is assured with this feature. The bearings are prelubricated through the stem in rod end bearings and through lubrication holes in the spherical bearings. Each bearing race insert is so designed that it may be adjusted to any desired degree of relationship to the ball. Circle No. A11.



Vapor Collectors. Requirements peculiar to jet engine blade finishing operations performed on Pratt & Whitney Airfoil blade grinders have resulted in changes in the Dustkop Model VCM-2 vapor collectors. They now employ paddle wheel fans to cope with sludge as well as mists from finish contour grinding of the jet engine blades with abrasive cloth. Slight increase in the overall height with increase in total capacity with the same ¾ hp motor is the result of the improvement, according to the makers of the dust collectors, Aget-Detroit Company of Ann Arbor, Michigan.
Circle No. A12.



Precision Knife Grinder. Hanchett Mfg. Co., Big Rapids, Mich., has a new Model "DN" precision knife grinder, featuring a new automatic table drive trans-



mission. This drive is positive, quiet, non-slipping and eliminates a complete train of gears. The drive is entirely free from vibration, chatter reversal shock.
Circle Inform-A-Gram No. A13.

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COUNTERSINKS and DEBURRING TOOLS

With Single Cutting Edge

Revolutionary! Chatterless!

• Greater ease in cutting is the outstanding feature of these new cutting tools—made for 82° angle countersinking and for 90° angle deburring operations. Have only a single cutting edge which prevents chatter. Both tools are regularly made for right hand cut. One trial will convince you. Special tools of this type made to order.

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WELDON Distributors throughout U. S. A. and Canada carry complete stocks to serve you

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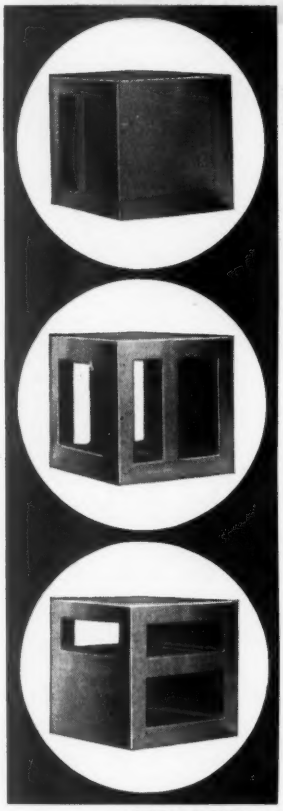

3 IN 1

COMBINATION TOOL

CHALLENGE UNIVERSAL BOX ANGLE

This new versatile tool has the clamping facilities of an *angle iron* . . . the stability, balance and accuracy of a box *parallel* . . . the perpendicular flat surface of an angle plate. Made of high grade special analysis semi-steel, heat treated and precision ground. Furnished in two sizes — 6x6x6 and 8x8x8 inches. Other sizes can be made to order.

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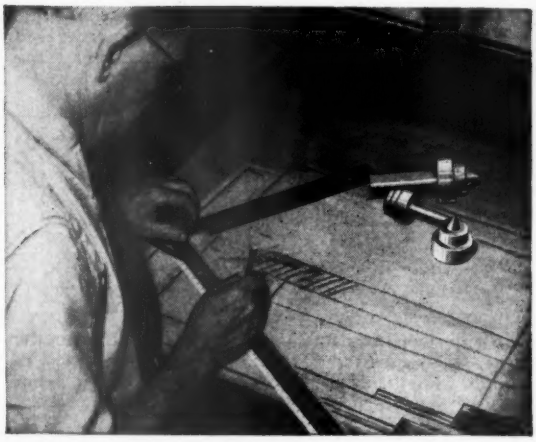

Engineered Live Centers . . A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDI-MATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse taper carried in stock.

STURDIMATIC TOOL COMPANY

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CIRCLE INFORM-A-GRAM KEY NO. 140B

Boyar–Schultz

No. 1 PROFILE GRINDER

A fast operating precision machine tool designed for grinding difficult contours, odd and irregular shapes and profiles. It is a time saver for grinding and fitting dies and punches, grinding die clearances, repairing dies and sharpening punches.

No. 1 Profile Grinder is ideal for many other grinding tasks where set-up on other machines is not practical such as grinding cams and templates to scribed lines and in removing flashing and gates from plastic parts.

For larger, heavier work, use our No. 2 Profile Grinder.

Write for Circular

High speed spindle with pre-loaded ball bearings turns at 20,000 R. P. M. Stock removal is rapid, even with small diameter wheels. Vertical oscillations of ⅛" provide even wheel wear. Accommodates wheel sizes, ⅛" to ¾" diameters.

BOYAR-SCHULTZ CORPORATION 2112 Walnut St., Chicago 12, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 140C

Beauty TO LOOK AT
...BEAUTY IN
Performance

Hollow-ground and bright all over, Reltool End Mills are not only the best looking end mills you ever saw . . . they're proven in performance and cutting efficiency. In addition, they're designed for *easy chip flow* and 10% to 35% longer cutting life. Next time you need End Mills, re-tool with Reltool!

The RELTOOL Line Includes: Combined Drill and Countersinks • Cut-off Blades • Die Sinking Cutters • Dovetail Cutters • End Mills • End Mill Holders • Hollow Mills • Key Seat Cutters • Lathe Centers • Lathe Mandrels • Machine Countersinks • Metal Slitting Saws • Milling Cutters — all types • Screw Slotters • Tool Bits • Specials.

Write for Reltool's net price catalog 53.

Reltool CORPORATION
RELIABLE METAL CUTTING TOOLS
4540 W. BURNHAM ST. • MILWAUKEE 46, WIS.

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CIRCLE INFORM-A-GRAM KEY NO. 141A

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½	7.50
¾	12.00
1	14.40
1½	21.60
2	30.00
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HAND TOOLS 7/16" x 6"

SID TOOL COMPANY, INC.
CUTTING TOOL SPECIALISTS
126 LAFAYETTE ST.
NEW YORK 13, N. Y.
BEekman 3-4270

CIRCLE INFORM-A-GRAM KEY NO. 141B

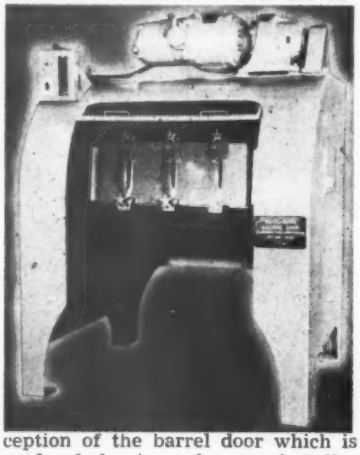
Hydraulic Cylinder. An improved key-type hydraulic cylinder is now being produced by Carter Controls, Inc., 2920 Bernice Rd., Lansing, Ill. This new cylinder has a number of features such as a long meehanite

rod bearing, providing a full one to one surface for extra wear. Also chevron type packing is replaced easily and the whole bearing insert is held by merely inseting a locking snap ring at the rod end.
Circle Inform-A-Gram No. A14.

A New Machine Set-Up Kit in a wide range of sizes is now being marketed by the Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland 10, Ohio. The kit is designed to save

set-up time and assembly costs by keeping all necessary set-up items handy at the machine. Kits are designed for set-up of milling machines, jig borers, boring mills, gear cutting machine and drill presses.
Circle Inform-A-Gram No. A15.

A New Barrel Tumbler that removes welding slag, flame cutting slag, burrs and rust from weldments and machined parts has been developed by the White-Roth Machine Corp. of Lorain, Ohio. The compact unit is of welded steel with the ex-



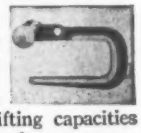
ception of the barrel door which is made of aluminum for easy installation or removal. The insides of both barrel and barrel door have neoprene linings that, not only greatly increase the barrel life, but assure quiet operation.
Circle Inform-A-Gram No. A16.

Producers Pare Stamping Costs

Modern Coil Handling Equipment Widens Use of Low Cost Coil Stock

The battle to keep down costs is going well for producers of stampings. Coil stock and modern coil handling equipment are the decisive factors. Coil stock, with only two scrap ends to its entire length is far more economical than strips of straight stock with two scrap ends to every ten feet. Moreover, the type of coil loading and handling equipment built by F. J. Littell Machine Co. makes coil stock easier to handle than straight stock. Stamping producers are taking full advantage of these developments. Coil stock and Littell Coil Hooks, Reels, Straightening Machines and Automatic Roll Feeds are in wider use today than ever before.

Hooks Serve Two Ways



. . . Littell Hooks make it a simple matter to unload coils on delivery, and to load reels. The variety of sizes have lifting capacities from 1,000 to 40,000 pounds.

Two Types of Reels . . .

Littell Coil Cradle Reels mount heavy coils, up to 30,000 pounds. Spindle Reels handle coils up to 40,000 pounds. Each type is available in plain or motor driven designs.

Straighteners Flatten Stock... Removing curvature from coil stock as it passes from reel to punch press die is the function of Littell Straightening Machines. All models are the same basic design. Variation is in the number and diameter of straightening rollers employed . . . from 1" to 90" in width, and from .010" to .125" thickness.

Automatic Roll Feeds . . . Press output in many shops has been multiplied five times by simply attaching Littell Roll Feeds to presses for blanking, drawing, piercing, or cut-off work. The Littell Roll Feed is used with compound dies, single station dies, and progressive dies. Standard models are easily attached, serve all types of presses, and handle all standard widths and thicknesses of stock.

Descriptive details and prices on Littell Hooks, Reels, Straighteners and Roll Feeds are available on request. Inquiries are given immediate attention when addressed to

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CHICAGO 13, ILL.

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ABERDEEN S. D.

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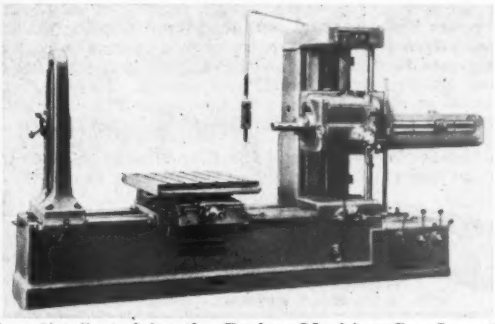
"Rotamatic" Surface Grinders in 10", 12", 14", 16" and 18" have been added to the line of machinery offered by Standard Electrical Tool Co., Mt. Hope & 6th Sts., Cincinnati 4, Ohio. These machines are automatic and hydraulically and electrically controlled. They are equipped with Standard's 7½ or 10 hp precision motorized grinding spindle with heavy end thrust construction. There is an adjustable stop for determining the grinding cut depth. **Circle No. A17.**

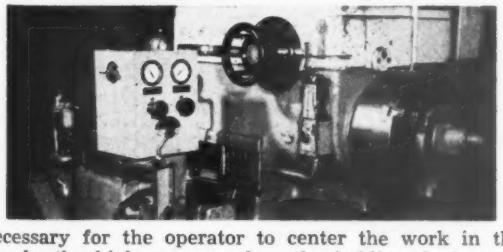
A 3" Horizontal Boring Mill for tool room and production work has recently been placed on the American market. Among the many features of this machine,



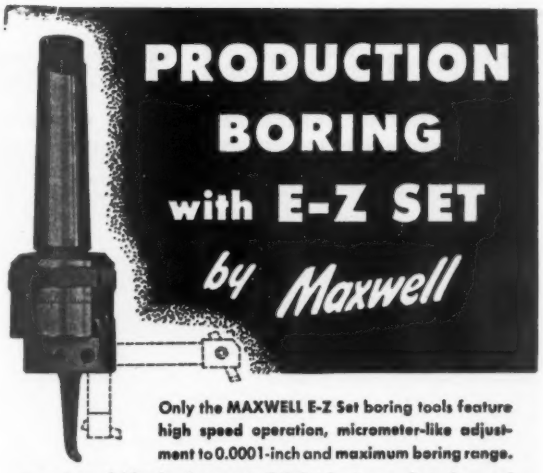
being distributed by the Parker Machine Co., Inc., 158 Pioneer St., Brooklyn 31, N. Y., is a table top that swivels a full 360°. The machine also is capable of 18 spindle speeds ranging from 17 to 810 rpm's.
Circle Inform-A-Gram No. A18.

Press Brake. Dreis & Krump Mfg. Co., 7400 S. Loomis Blvd., Chicago 36, Ill., announces a new model light-duty press brake for bending and forming sheet metal and steel plate. The machine is available in 3 sizes with capacities of 54" x 10 gauge to 120" x 16 gauge. Further details available from the manufacturer. **Circle No. A19.**

Air Chuck Controller. This Type 675 Air Chuck Controller was designed to provide two pre-set pressures for pressuring the air cylinder on lathes provided with air chucks. The lower pressure is advantageous when it is



necessary for the operator to center the work in the chuck; the high pressure does the holding during the machining. The chuck controller is a product of the Fisher Governor Co., Marshallton, Iowa.
Circle Inform-A-Gram No. A20.



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Interchangeable shanks permit E-Z Set boring tools to be used in turret lathe, jig-bore, milling machine, boring mill, automatic or other machine tools. Because they can be adjusted for cut in only one-tenth the time formerly required by similar tools, these Maxwell-made tools can meet high-speed production on schedules.

E-Z Set boring tools are available in three models having maximum boring bar capacities of ½, 1 and 1½ inches and covering a boring range of from ⅜ to 20 inches.

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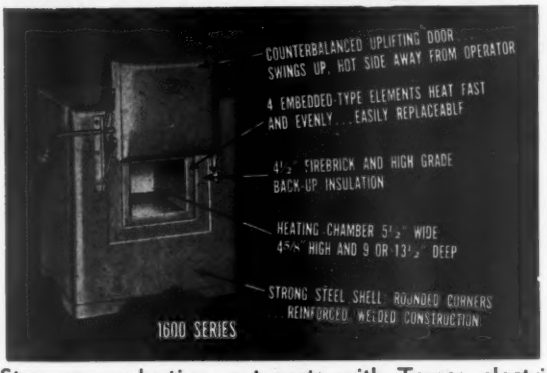
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"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

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You Harden It—We'll Drill It— With "HARDSTEEL"

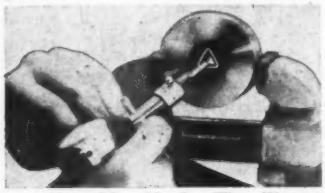
BLACK DRILL COMPANY, INC.

1368 East 222nd St. • Cleveland 17, Ohio

Also makers of— BLACK DRILLING UNITS—AUTOMATIC, SELF-CONTAINED—FOR COST-CUTTING PRODUCTION ON ALL MATERIALS *Write for information*

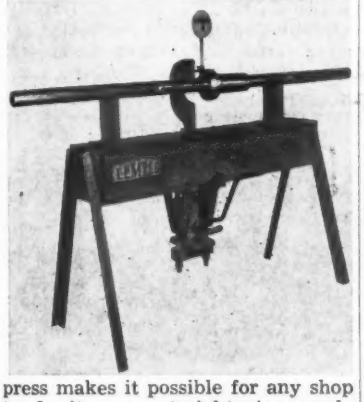
CIRCLE INFORM-A-GRAM KEY NO. 144D

Tungsten Carbide Dies can be repaired, altered and even produced from blanks of pre-sintered carbide by using this new Nord Di-Profiler, a product of the Nord International



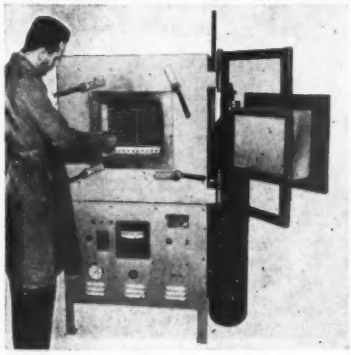
Corp., Denville, N. J. The illustration shows the making of a triangular shaped drawing die with the Di-Profiler. Complete literature on this tool now available.
Circle Inform-A-Gram No. A21.

A New Straightening Press has been introduced by LEMPCO Products, Inc., Bedford, Ohio. This new



press makes it possible for any shop to do its own straightening work. The press saves unnecessary grinding and turning. It measures 65" along the bed.
Circle Inform-A-Gram No. A22.

High Temperature Vacuum Furnace. The K. H. Huppert Co., 6830 Cottage Grove Ave., Chicago 37, Ill., has designed a new type high temperature electric vacuum furnace,



called the "Airfre" model. This furnace has been designed for production and laboratory use where temperatures up to 2500° F. and vacuums up to 29" are required.
Circle Inform-A-Gram No. A23.

"To sum it up, chief, we can do it if we use Columbia MAXITE Tungsten-Cobalt High Speed Steel."

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

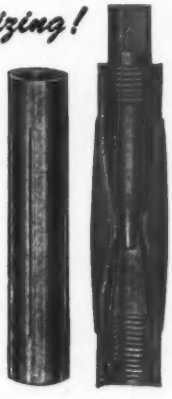
Producers of fine tool steels—High Speed Steels Die Steels—Hot Work and Shock Resisting Steels Carbon Tool Steels.

TOOL COLUMBIA STEELS

CIRCLE INFORM-A-GRAM KEY NO. 145A

Flexolap... **INSTANTLY AND ACCURATELY ADJUSTABLE FOR FAST CUTTING AND POLISHING**

...without danger of galling or seizing!



The Flexolap barrel is made with a series of longitudinal slots milled "off-center" to permit sensitively flexible expansion up to 15%—or more—under pressure of the adjusting pin. This construction enables Flexolap to save valuable time and to lap rounder, straighter holes. For accurate precision take-up, as desired, to maintain size and compensate for wear on barrel . . . simply turn adjustment screw.

Illustrated at left is Flexolap Set No. 1. Includes 6 complete laps, one of each size (3/16", ¼", 5/16", ⅜", 7/16" and ½"), and one additional brass barrel of each size, all held on a sturdy, serviceable stand. Price complete $14.00

Also available in sizes 7/32", 9/32", 11/32", 13/32", 15/32", 9/16", 5/8", 11/16" and 3/4". For lapping holes smaller than 3/16", use the Midget Lap. Seventeen sizes: .032, .036, .040, .046, .054, .062, .070, .079, .090, .104, .120, .135, .155, .170, .187, .218, and .250. Trial assortment (17 laps) $2.10

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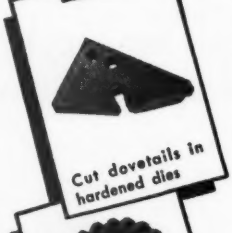
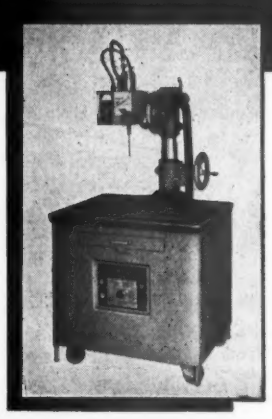
FEDERAL TOOL CORP. 3600 Pratt Blvd., Chicago 45, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 145B

METAL DISINTEGRATION

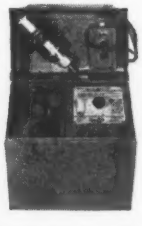
and what it can do for you





Literally hundreds of thousands of dollars are saved annually by corporations that are using Metalmasters in just tool and die repair alone.

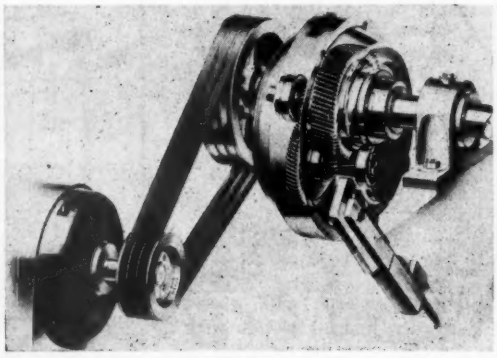
There's a technical engineer in your area to give you an on-the-spot demonstration in your own plant at your convenience. (NOTE: It is not uncommon to pay for a Metalmaster with just one short demonstration through savings on workpieces.)



There's a Metalmaster designed for your operation and priced to fit your needs. For information as to the many uses and benefits Metalmaster can offer you, write today on your company letterhead to:

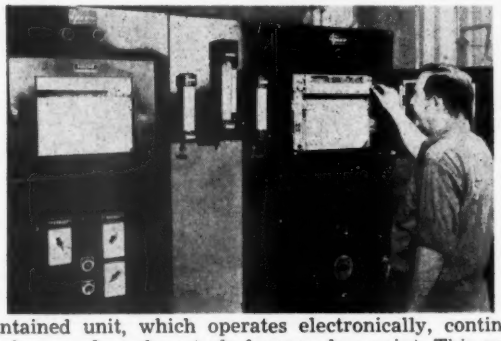
Metalmaster
DIVISION OF CLINTON MACHINE COMPANY
CLINTON, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 146



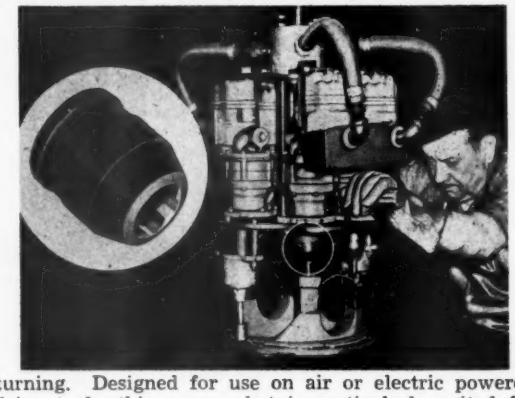
Shaft-Mounted Speed Reducer. A new 13-to-1 ratio series of shaft-mounted speed reduction units has been introduced by the American Pulley Co., 4200 Wissahickken Ave., Philadelphia 29, Pa. The new "Shaft-King" units are exceedingly compact. They only require standard shaft lengths also.
Circle Inform-A-Gram No. A24.

Heat Treating. An Automatic Dew Point Controller which regulates atmosphere dew point in controlled atmosphere metal treating furnaces has been developed by Ipsen Industries, Inc., Rockford, Ill. The new self-



contained unit, which operates electronically, continuously records and controls furnace dew point. This new instrument makes possible completely automatic heat treating cycles such as carburizing and carbon restoration. **Circle Inform-A-Gram No. A25.**

Surface Drive Tool Socket. The Cornwell Quality Tools Co., 1056 Cleveland Ave., Mogadore, Ohio, has developed a new type hexagonal nut socket that permits the nut running tool to positively engage the nut while



turning. Designed for use on air or electric powered drive tools, this new socket is particularly suited for multiple nut running in mass production applications. Catalog No. 1-53, describing the nut socket and other Cornwell impact tools will be sent upon request.
Circle Inform-A-Gram No. A26.

EXTRA HARD EXTRA TOUGH
for Millers Duplicators Die Sinkers Pantographs
BLACK STRAND Cutters-Blanks
Write for Literature and Prices
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Box 54, West Side Sta., Worcester, Mass.
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JIG BORING
Done to your specifications
We Have
12 Jig Borers
Including the largest
Pratt & Whitney made
BLOOMFIELD TOOL CORPORATION
30 Farrand St. Bloomfield, N. J.
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CAM MILLING
A SPECIALIZED CAM MILLING SERVICE... JIG BORING... SPOT WELDING... CONTRACT PRODUCTION ... EXPERIMENTAL DEVELOPMENT
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has been done with the
SCLEROSCOPE
since 1907
THE SHORE INSTRUMENT & MFG. CO., INC
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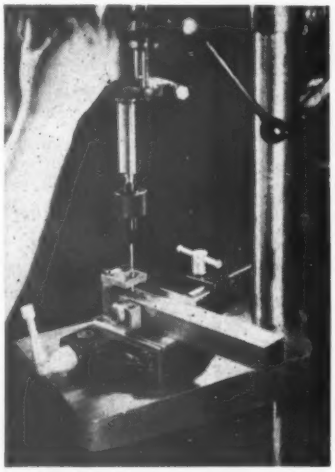
OK T-slot Bolts
The world's best . . . one-piece, drop-forged—not welded—of mild carbon steel, heat-treated, with head accurately milled for standard tables on lathes, planers, boring mills, milling machines. Integral washer and nut. Sizes: up to 30". Typical direct prices for 10" lengths: ½ — $1.36; ⅝ — $1.36; ⅝ — $1.58; ⅞ — $1.89. Write for price list
THE OK TOOL COMPANY, INC., Milford 8, N. H.
CIRCLE INFORM-A-GRAM KEY NO. 147E

Barnaby Self-Closing Knurling Tools operate on an entirely different principle and are quickly set for high speed precision knurling behind shoulders or at any distance

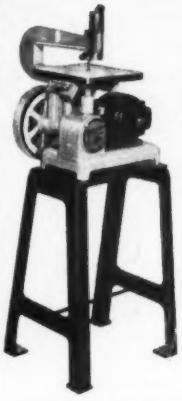
from the end of the work on both automatic and hand screw machines. The knurling tools, manufactured by Barnaby Mfg. Co., Inc., 74 Knowlton St., Bridgeport 8, Conn., are finished by the new Du-Lite process which gives them longer life. **Circle Inform-A-Gram No. A27.**

Safety Vise. A new instant change safety vise designed for fast set-ups on production pieces and featuring a lightning-fast ratchet jaw, has been announced by the Wahstrom Float-Lock Sales Dept. of the American Machine & Foundry Co., 511 Fifth



Ave., New York 17, N. Y. The new model has three bosses for easy jig attachment. Any number of holes can be drilled without removing the work as the vise turns over on three sides for maximum drilling flexibility.
Circle Inform-A-Gram No. A28.

CUT TOOL AND DIE-MAKING COSTS WITH . . . Milwaukee
DIE FILERS
PROFILE GRINDERS



DIE FILERS
. . . for straight-line sharp corner filing, sawing and lapping
This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.
Write for illustrated Bulletins and Prices

PROFILE GRINDERS
. . . for high speed Precision Grinding of curved and Irregular Contours
Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

RICE PUMP & MACHINE COMPANY
228 Park Avenue Belgium, Wisconsin
CIRCLE INFORM-A-GRAM KEY NO. 147F

YOST DRILL PRESS VISE
● This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.
OFFERED IN TWO SIZES

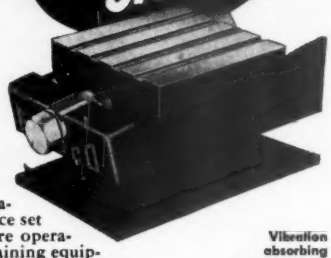
Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	5	5½	23

Do you need a vise of ANY type?
Write today for bulletin on the extensive Yost line
YOST MFG. COMPANY
1000 MAIN STREET
Meadville • Pennsylvania
CIRCLE INFORM-A-GRAM KEY NO. 147G

Here's how to SAVE TIME in SETTING-UP and KEEPING your MACHINES LEVEL

Fast Accurate Self-Aligning Machine Leveler

Empco JACK



Empco Jacks enable you to meet hurry-up demands for relocation of machinery by giving you the fastest, easiest, most accurate machine leveling ever known: you simply raise or tilt machine sufficiently to allow the Empco Jacks to be slipped under base. The number of jacks required depends on weight of machine and size of base. Once set on Empco Jacks, the entire operation of leveling and maintaining equipment level is quickly done. By applying a wrench to the "hex" head of adjusting screw, an adjustment is obtained either up or down until your level indicator reads "zero." Write for specifications and prices today.

Vibration absorbing mounting pads increase machinery life.

EMPCO PRODUCTS

THE ENTERPRISE MACHINE PARTS CORPORATION
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RAYMAC Solid Carbide DRILLS and REAMERS

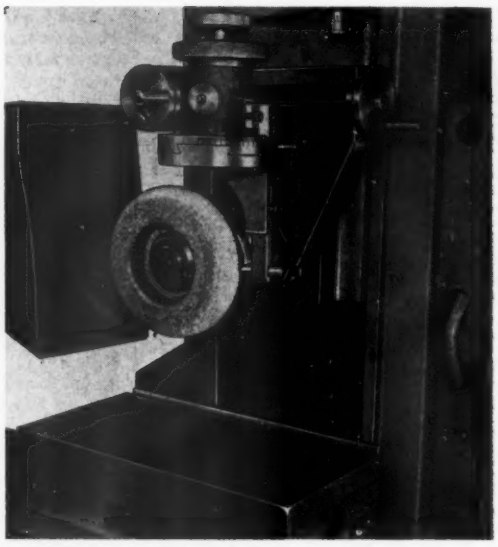
RAYMAC drills cut hardened metal . . . do not burn or anneal. Feature operational speeds of 350 to 600 RPMs depending on size and hardness of metal.

RAYMAC solid carbide reamers are custom designed for individual jobs. Our engineering department is at your service to solve your reaming problems.

Write for catalog No. 12.

RAYMAC MANUFACTURING COMPANY INC.
3729 CASS AVENUE, DETROIT 1, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 148B

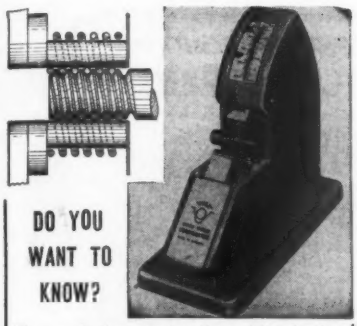


Radius Tangent Wheel Dresser. A new principal in wheel dressing that completely eliminates set-up time for re-dressing is incorporated in the new Radius Tangent Wheel Dresser made by the Spike Mfg. Co., 24609 Middlebelt Rd., Farmington, Mich. Literature and details on this new time-saving precision tool will be sent upon request. **Circle Inform-A-Gram No. A29.**

Better Square Holes. One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications. The Sturdy-Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. The sleeves are of two types; one has the hole tapped at one end to receive a

backup screw which is furnished with the sleeve. The other type has a plain square hole without threads. The sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes. Write to Sturdy Broaching Service, 23516 Telegraph Rd., Detroit 19, Mich., for further information. **Circle Inform-A-Gram No. A30.**

New Electrical Mountable Handtool. Here is an air-cooled, vibrationless tool with sufficient speed, power and precision to operate Tungsten carbide midget mills as well as other rotary tools for grinding, finishing and polishing within a range from 3/32" to 3/16" in shank diameter. The handtool is manufactured by Precise Products Co., 1328-30 Clark St., Racine, Wis. **Inform-A-Gram No. A31.**



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The exact size of your Screw Threads, the actual discrepancy of Rejects, how much to allow for Plating, how to avoid Rejects? Limit or Ring Gauges cannot supply the answer, but the O-Vee Comparator with its patented screw thread measuring principle, will indicate the actual size of a screw without the need for costly set plugs. Used and approved by leading Government Depts., Aircraft & Automotive plants.

Write for descriptive literature

O-VEE CAUGE COMPANY

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CAMS

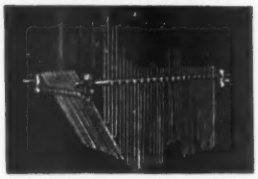
Made to Your Specifications

Let Us Handle Your Cam Problems

BLOOMFIELD TOOL CORPORATION
30 Farrand St. Bloomfield, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 149B

ADJUSTABLE ROD GUARD for Power Presses



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MFGR. OF COMPLETE LINE OF PRESS GUARDS
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DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Penna.

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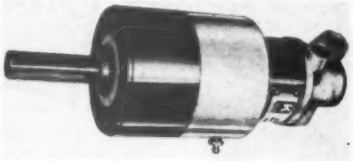
Vard Ball Screwjack Assemblies are available in a wide range of sizes to meet any problem which calls for transmission of rotary motion to linear motion. An extra high

efficiency curve is achieved through the freely circulating ball bearing arrangement. (inset). The assemblies are made by Vard Inc., 2981 E. Colorado Ave., Pasadena 8, Calif. **Circle Inform-A-Gram No. A32.**

Surface Plates. To supplement its line of black granite, the Collins Microflat Co., 2326 E. 8th St., Los Angeles 21, Calif., has brought out a new line of gray granite surface

plates. The gray granite sizes range from 12" x 18" to 48" x 72" in 2 and 4-clamp edge types. Surface accuracies are finished down to 0.00005 inches. Literature on the new surface plates is available. **Circle Inform-A-Gram No. A33.**

Air Motors. A new line of air motors featuring an axial piston design that results in low air consumption has recently been placed in production by Keller Tool Co., Grand Haven, Mich. Unusually compact



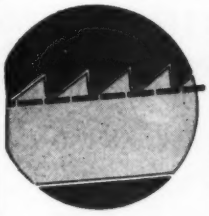
and instantly reversible, the new 70A series air motors are available in ratings from ½ to 2¾ hp, in 12 combinations of speed and torque to meet a wide variety of industrial applications. Full specifications are given in Keller's Catalog, Section 70. **Circle Inform-A-Gram No. A34.**

Atlantic
WAVY SET BANDS...

FOR FAST, ACCURATE GANG CUTTING!

Specially designed teeth clear away chips for speedier—cooler—precise cutting. Atlantic Wavy Set Bands have precision milled, even set teeth that slice through multiple drill rods, bar stock, I beams or tubing for gang cutting efficiency. Increased blade flexibility and uniformly heat hardened teeth make this—like Atlantic's complete saw line—supreme in durability, operating efficiency and dollar saving economy.

ATLANTIC QUALITY CONTROL STARTS HERE . . .



The band saw teeth—and *only the teeth* are scientifically hardened to guarantee the sharpest, keenest cutting edge. The entire saw body remains flexible. This precision heat treating increases blade life—saves blades, down time and dollars!

Atlantic engineered with a wave of teeth to the left, then to the right to sweep away chips during cutting. Saw operation is Free! Easy! Efficient! Better finishes result with no chips to score or mar work.

FREE!

This pictorial story on Atlantic Wavy Set Bands. Send for your copy today. Have you a specific band saw problem? Include a brief description — it will meet with interested engineering attention and will be promptly acknowledged.

Atlantic

ATLANTIC SAW MFG. COMPANY, Inc.
158 Brewery St., New Haven, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 149E

Speed-up OPERATIONS with heinrich "Grip-Master" Drill Press Vise

Positive locking by light press on lever.
Instantaneous setting by simple push on knob
Straight through drilling with extra wide clearance.
Hardened and ground bars and locking mechanism.
Large loading and unloading capacity.
Built-in, recessed parallels level work.

(Right) Grip-Master used as base structure to speed up and improve accuracy on a difficult drilling operation.

Cast bosses in stationary jaw for easy jig attachment.

heinrich TOOLS, INC.

NEW CATALOG FREE!

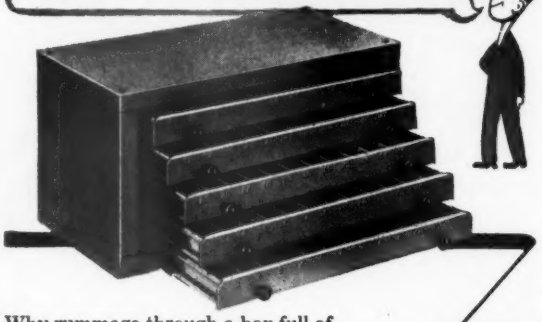
Be sure you have a complete Heinrich Tool Catalog in your files. Your copy will be sent free upon request.

DEPT. 133-L • RACINE, WIS.

Drill Press Vises • Fixture Locks • Nibblers Punches • Rod Cutters

CIRCLE INFORM-A-GRAM KEY NO. 150A

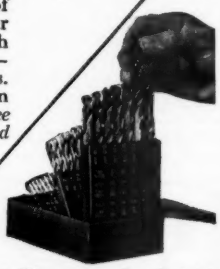
Drills at your fingertips—
HUOT DRILL DISPENSER



Why rummage through a box full of drills when the Huot Drill Dispenser will keep them sorted by sizes? Each compartment holds many drills—several dozen in the smaller sizes. Beautiful light gray hammerlin baked enamel finish. *Made in three models for fractional, number and letter drills.*

Write for Drill Dispenser Bulletin

HUOT DRILL INDEX



The simplest filing system for all twist drills. Panels fold into container like pages of a book. Seventeen models for drills from No. 80 wire gauge to 1-inch size.

HUOT

HUOT MANUFACTURING CO.

581 North Wheeler Street, St. Paul W4, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 150B

DEBURRING Made Easy!

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WRITE FOR ABRASIVE BELT GRINDER-POLISHER CATALOG

Hammond Machinery Builders INC.

1631 DOUGLAS AVENUE • KALAMAZOO MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 150C

FAST-ACCURATE...

ANGULAR INSPECTION SET-UPS

the SINE-PLATE

Now angular inspection set-ups as accurate as the measuring instruments used can be made in a few moments. Any angle, single or compound, is set up by inserting standard gauge blocks between the Sine-Plate plates. Proper size blocks are indicated for all angles in table supplied. Saves hours of set-up time, guarantees accurate inspection. In two sizes; also magnetic models for machining operations.

SEND FOR CATALOG

OMER E. Robbins COMPANY

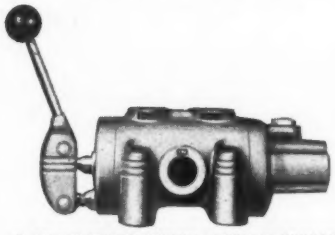
Manufacturers of the MAGNA-SINE and Other Precision Tools

5722 TWELFTH ST. • DETROIT 8, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 150D

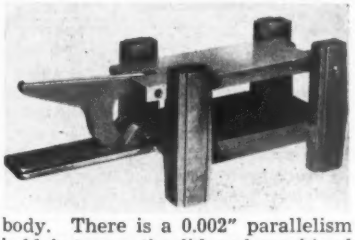
Radial Hole-Drilling Machine. A standard machine which does away with the necessity of building special machines for drilling radial holes in a great variety of parts has recently been placed on the market by the Grovo-Nelson Co., 1931 An-

toinette, Detroit 8, Mich. Any number of Grovo-Nelson automatic drilling units up to 8 may be employed, the units being movable not only through 360° on the circular table, but also movable endwise on riser plates to meet the requirements of the part being drilled.
Circle Inform-A-Gram No. A35.

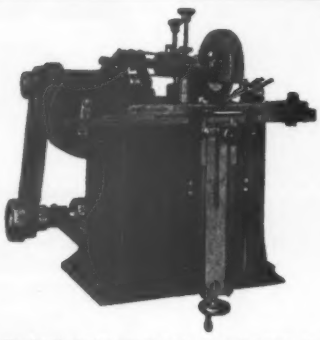


A NEW HYDRAULIC 4-WAY VALVE with ball detents to hold the valve piston in any given position is now being marketed by Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Mass. The locking action of the new detent permits the valve to be mounted vertically as well as horizontally and prevents vibration from causing a movement of the valve piston. Circle Inform-A-Gram No. A36.

Leaf Jig. A new leaf jig for drilling, tapping and reaming has been announced by the West Point Mfg. Co., 26935 W. 7 Mile Rd., Detroit 19, Mich. The jig has a precision made steel lid and cam and a semi-steel



body. There is a 0.002" parallelism held between the lid and machined base. The jig can be used in any position. It is made in 11 base sizes, 1½" x 2" to 6" x 6" — 2 to 3 heights each. Template sheets are available as well as a bulletin on the jig.
Circle Inform-A-Gram No. A37.



Wardwell Model EC Combination Grinder. The only single unit grinder adaptable for hack, band and circular saws that does not depend on the shape of the grinding wheel to form the shape of the tooth. ● This unique feature enables operator to grind a variety of blades without dressing or changing wheels.

sharpening 1 gross of hack saw blades PAYS for this machine!

One gross of hack saw blades can be resharpened at least 6 times—actually saving you the price of the machine!

Wardwell EC Grinder gives old blades a keener, longer lasting cutting edge—because new blades are usually not ground after hardening.

Wardwell EC wheels will not burn, anneal or injure hardness of teeth. Sharpen Circular, Hack or Band Saw blades on one machine!

WRITE FOR BULLETIN EC TODAY

Complete Wardwell Catalog describing more than 30 grinding, sharpening, setting and swaging machines also available.

THE WARDWELL MANUFACTURING CO.
3808 Ridge Road, Cleveland 9, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 151A

HIGH SPEED or CARBIDE BORING TOOLS
For MASS PRODUCTION

LAPPED CUTTING EDGES FOR BETTER "BORES" AND FASTER FEEDS

FOR HOLES FROM 1/16" UPWARD
17 DIFFERENT SIZES

- FAST PERFORMANCE
- ECONOMY IN PRODUCTION
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Dealers! Here's a Profit-Maker!

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COMET Tool Co. 738-T Broadway New York 3, New York

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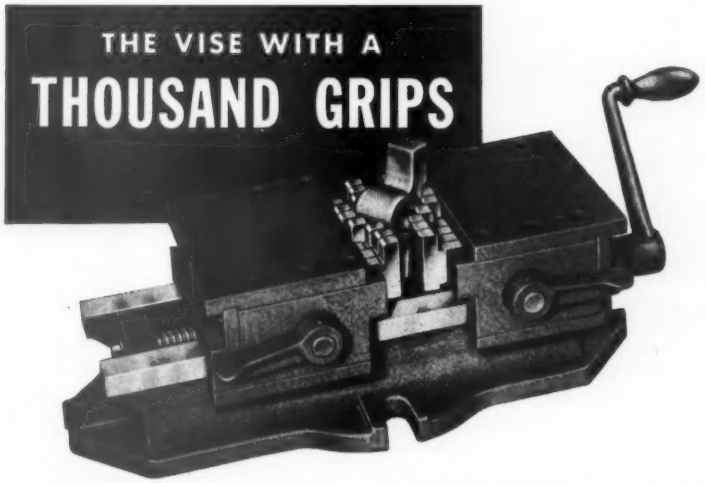
THE VISE WITH A THOUSAND GRIPS



A veritable mechanical octopus that grips odd and irregular shaped parts "from ball bearings to multi-bearing shafts" with tentacles of steel.

ASSURES POSITIVE GRIP for any milling, cutting or drilling operation.

SAVES TIME AND MONEY—no more blocking and shimming odd shaped pieces for tool room machining.

UNIVERSAL APPLICATION — Can be used on any and all types of machine tools. Manual and air operated.

PRODUCTION JIG—The jaws form a mold or matrix to take identical pieces for grinding or machining, only has to be set once. Saves many dollars on small production runs.

Try it out in your own shop, see what it will do for you, in labor saving, better work in faster time. Built to last a lifetime.

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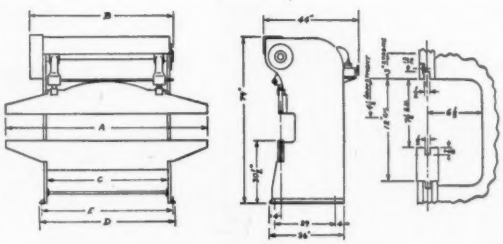
AMERICAN POSITIVE GRIP VISE CORPORATION
1-C Olivine Street • Willimansett, Massachusetts

CIRCLE INFORM-A-GRAM KEY NO. 151C

Big... PRESS BRAKE STANDARDS at small press cost–

SEMCO MODEL 600 Press Brake

MODEL NUMBER	BENDING CAPACITY MILD STEEL	A	B	C	D	E	STROKE	RAM ADJ.	STROKES PER MIN.	MOTOR H.P. and R.P.M.
600	72"-14GA	72"	66"	58"	64"	62½"	3"	4½"	16 to 40	1½
800	96"-16GA	96"	66"	58"	64"	62½"				1800



EXTRAS that you get at no additional cost are often the features of presses costing twice as much. Take the BUTTRESS THREADS in a revolving bronze nut with release grooves to prevent jamming and the FINE ADJUSTMENT—one revolution of the hand crank gives a precision ram adjustment of .0125".

A cast steel fly-wheel of EXTRA size, a one piece crankshaft of forged alloy steel, ball and roller bearings throughout with alloy bronze bearings in the eccentric crankshaft. These are but a few of the EXTRA quality features in the SEMCO PRESS BRAKE.

Made by the makers of famous "34 year" BRAKE DIES.

Write for illustrated color folder of SEMCO PRESS BRAKES and 26 styles of standard BRAKE DIES, today.

SEMCO

SERVICE MACHINE CO., Inc.

162 MILLER STREET, ELIZABETH 4, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 152A

SAVE TIME and MONEY with GARBERDING

STOP-PINS — AVAILABLE IN 5 SIZES

FINGER STOPS — IN 3 SIZES

STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside STOPS for springs to catch on. Write for literature and prices. GARBERDING FINGER STOPS made in uniform width to fit any standard width slots. Just grind ends to fit. Write for Literature.

TWENTIETH CENTURY MANUFACTURING CO.

Box 492-TP, Libertyville, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 152B

If you buy Cutting Tools

HERE'S HELP FOR YOU!

- TOOL BITS
- END MILLS
- MILLING CUTTERS
- CUT-OFF BLADES
- ALLOY CENTERS
- SLITTING SAWS
- INSERTED BLADE CUTTERS
- WEAR PARTS
- HIGH SPEED, CAST ALLOY, CARBIDE "SPECIALS"
- ROLLS
- ROTARY SHEARS

Do you buy or specify cutting tools and wear-resistant parts? You'll find this Gorham Tool Catalog a *helpful time saver!* Its 120 pages are packed with useful cutting tool information . . . plus a valuable section of Engineering Data. Request your free copy on company letterhead. In *special* tooling problems, consult your nearby Gorham field engineer. His counsel is yours for the asking, and it's backed by Gorham's 35 years' experience in the design and production of fine cutting tools. Write for his name.

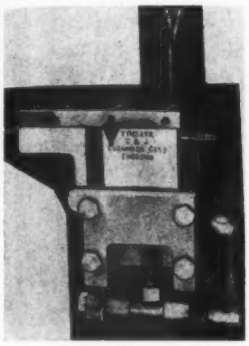
Gorham TOOL COMPANY

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

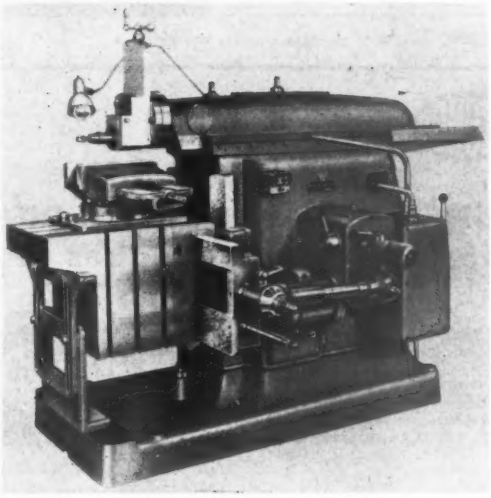
14415 WOODROW WILSON • DETROIT 3, MICHIGAN

WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne 4, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 152C

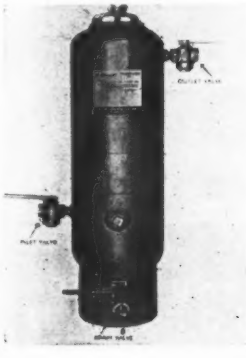


Work Holding Fixture. This new cross drill fixture made by C & J Screw Machine Products, Inc., 445 S. Line St., Columbia City, Ind., can quickly and securely be clamped to the swing table of ordinary drill presses. It provides a standard set-up for most any production cross drill job and eliminates the expense and time of having cross drill fixtures designed and made for such drilling operations. **Circle No. A38.**



PLAIN & UNIVERSAL SHAPERS, which have been manufactured in Sweden by Varnamo Maskinakiebolag for more than 50 years, are now distributed in the United States by the Austin Industrial Corp., 76 Mamaroneck Ave., P. O. Box 430, White Plains, N. Y. Detailed literature on the shapers is available from Austin. Circle Inform-A-Gram No. A39.

Toggle Clamps. Made by the Detroit Stamping Co., 350 Midland Ave., Detroit 3, Mich., these toggle clamps permit positive locating and sure holding pressure. The United Stove Co. of Ypsilanti, Mich. has increased production of air-ducts for automatic washer-dryers over 50% by re-designing fixtures with the Detroit Stamp toggle clamps. **A40.**



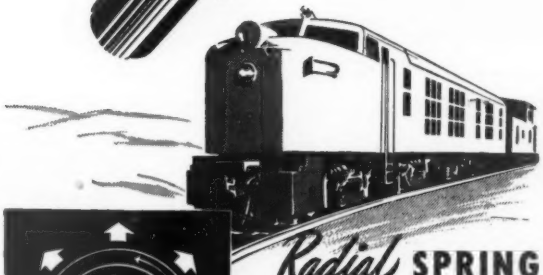
Pure, Dry Compressed Air. Self-adjusting nozzle coupled with non-clogging aspirator is a feature added to the Vi-Speed Dehumidifier and Filter made by Van Products, 3778 W. 12th St., Erie 2, Pa. This automatic control stabilizes unit operation during variable air pressures and volumes. A complete report on other features of this self-cleaning compressed air purifier is available. **Circle No. A41.**

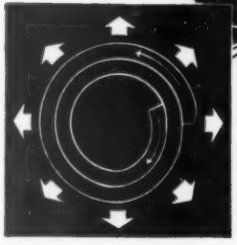
NEW radial spring action fastens better!

SPIROL PIN

Does the job here

and here too!





***Radial* SPRING ACTION MAKES SPIRAL COILS SHOCK-PROOF!**

From tiny eyeglass-hinge pivots up to ½" or larger fastenings used in locomotives, the all-around tension of spiral coils gives SPIROL PIN unique fastening properties. When compressed by insertion, SPIROL PINS develop *evenly distributed* radial spring tension — no weak "hinge" lines. This spring action locks SPIROL PIN in place — eliminates close tolerances — allows easy removal and re-use of pin. True radial flexibility permits shock-proof fastening of hard and soft materials — eliminates internal stresses in component parts. SPIROL PINS have chamfered ends for easy insertion.

NEW REDUCED PRICES on all SPIROL pins. Write for new price list and free sample SPIROL pins.

C. E. M. COMPANY

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CIRCLE INFORM-A-GRAM KEY NO. 153

JACO Horizontal

STOCK REEL

LOW COST — AUTOMATIC

No motors — No belts — No sprockets

POWERED BY THE NATURAL SPRING OF UNCOILING STOCK . . .

JACO Stock Reel operates automatically . . . without attention or maintenance . . . so simple there is nothing to get out of order.

The loop of stock between the Coil and the Press Feed completely eliminates slippage, kick-back and over-run.

JACO Stock Reels handle all types of resilient coiled stock for light stampings up to 250 lb. coil weight . . . up to 36" coil diameter . . . up to 6" stock width.

Proved in actual use by major manufacturers.
Guaranteed to work on your job or money back.

Write today for full details

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HINGHAM, MASS.

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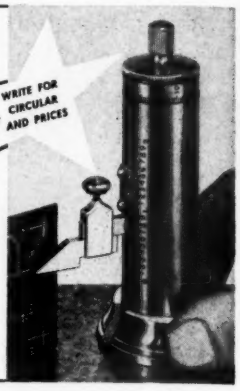
MICRO-HEIGHT GAUGE

WRITE FOR CIRCULAR AND PRICES

for fast, accurate layout

A new precision height gauge which reads like a micrometer and measures zero flush at base. Has a direct reading of 2" with scriber in upright position, and 3" with scriber reversed.

Replace scriber with dial indicator and Micro-Height Gauge measures center distances between holes or surfaces. As indispensable as a micrometer to toolmakers, layout men, and inspectors.



FAIRFIELD GAUGE COMPANY
170 HERBERT STREET
BRIDGEPORT 6, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 154B

CHICAGO **DIES**

Complete Line of PUNCHING and FORMING DIES for All Sizes and Makes of PRESS BRAKES

4392

DREIS & KRUMP MANUFACTURING COMPANY — CHICAGO
7428 S. Loomis Blvd., Chicago 36, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 154C

FRICTION SAWING WITH Tannewitz HIGH SPEED BAND SAWS

GREATEST COST SAVER IN METAL CUTTING

Tremendous savings of time and money are effected in trimming formed parts with Tannewitz High Speed Band Saws, for not only are the cuts made exceedingly fast, and smoothly, but in most cases no jigs or rests of any kind are required. Sheets of both hard and soft steel, and even such metals as 1" armorplate are handled with great advantage by this method, and it is ideal for trimming malleable and steel castings. By all means get the complete facts and learn of the many opportunities for boosting production and lowering costs that Friction Sawing with Tannewitz High Speed Band Saws offers. Write for circular.

for trimming castings of all metals write for bulletin on "Foundry Band Saws".

GL-6-1729

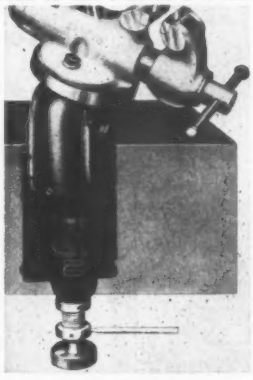
SAWING MACHINERY SPECIALISTS

The TANNEWITZ WORKS GRAND RAPIDS MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 154D

Inspection Marker. An inspection certification station may be set up right in the midst of any manufacturing or inspection group without the hazard caused by the presence of acids. This is one of the features of the self-contained cartridge stencil inspection marker made by the Lectroetch Co., 14925 Elderwood Ave., E. Cleveland, Ohio. It also is easy to use and the inspector's number can be applied to the work piece in one second. There is no smearing or waiting for the number to dry. The construction of the marker permits it to be placed in the shirt pocket of the inspector.
Circle No. A42

Heavy Duty Positioner. A new heavy duty hydraulic "PowRarm" positioner with carrying capacity of 1,000 lbs. has been developed by the Wilton Tool Mfg., 925-941 Wrightwood Ave., Chicago 14, Ill. This new unit will prove especially useful in foundries for positioning large castings for filing and chipping. It can be used vertically, as illustrated, mounted to the side of a work bench, or horizontally. There is a slotted base for use with drill presses, shapers, and milling machines for machining operations at compound angles. Its hydraulic action permits an operator to make a change of position under partial tension, to prevent work from accidentally falling. Blueprints on the positioner and a 28-page catalog describing the "PowRarm" and other industrial clamping tools are available upon request. **Circle No. A43.**



NEW TWIST DRILL GRINDER. This Alden Model 200 Twist Drill Grinder requires only two holders to sharpen all sizes of straight or taper-shank twist drills from ⅛" to 1½". An infinite range of point angles for drilling different kinds of material is instantly obtained by a simple 1-knob adjustment. The grinder is accurately calibrated for the standard 59° point as well as other frequently used points, such as 90°, 130° and 140°. The grinder is made by Alden Industries, Cuyahoga Falls, Ohio. Circle Inform-A-Gram No. A44.

16 HOLES -- THREE PRESSES — ONE OPERATOR!

FITS ON ANY DRILL PRESS

3 QUADRILLS ON 3 PRESSES DO WORK OF 16 SPINDLES AT RING MFG. CO.

QUADRILL

4-POSITION Instantly Adjustable tool drills, taps, reams, countersinks, counterbores — all on 1 drill press with 1 operator. Does work of 4 presses. Costs less than 1 press.

QUADRILL produces more holes faster—No time loss—Cuts production costs 33%.

Investigate this important time and work saver. *Write for Catalog Today*

CHICAGO QUADRILL CO.
1852 BUSSE HIGHWAY, DESPLAINES, ILLINOIS

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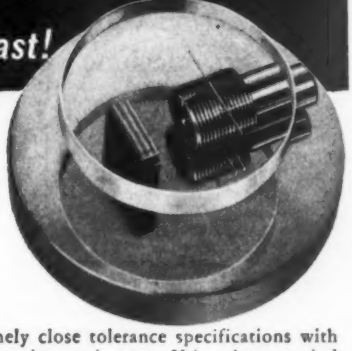
Measure in Millionths with LIGHT WAVES

It's Easy...Fast!



Determine Surface Flatness At a Glance

Meet today's extremely close tolerance specifications with modern scientific measuring equipment. Using Acme optical equipment, it is as easy to measure to millionths of an inch, as it is to measure in tenths with a micrometer. Make your measurements via light waves with Acme equipment. Write for complete information.

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manufacturers of optical flats and monochromatic lamps... mold polishing
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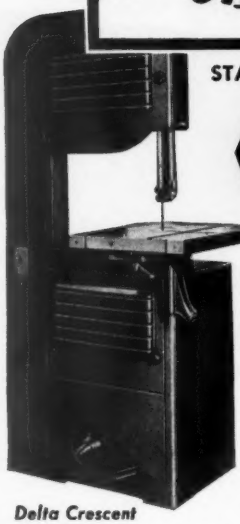
NOW! JIFFY Carter TIRES

STANDARD EQUIPMENT ON

DELTA CRESCENT BAND SAWS



Delta Crescent 20" Band Saw

Proof of Acceptance . . .

Delta-Crescent has joined the ranks of *leading* band saw manufacturers using CARTER Jiffy Tires as standard equipment because . . .

- *Jiffy Tires can be changed in 10 minutes*
- *Provide 2 to 4 times more wear*
- *Provide perfect traction*
- *Jiffy Tires are safe . . . won't throw at any speed*

● *WRITE FOR CATALOG*

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CARTER PRODUCTS COMPANY, INC.

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Grand Rapids 2, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 156A

PRECISE hole location, easy contour inspection with *new* machine tool microscope

Any machine shop, large or small, can save time and money on milling and boring work with the new Perkin-Elmer Model 11 Machine Tool Microscope. For hole location, its wide field of view (¼") or 30x magnification makes it possible to gage accurately to a ten thousandth—*at a glance.*

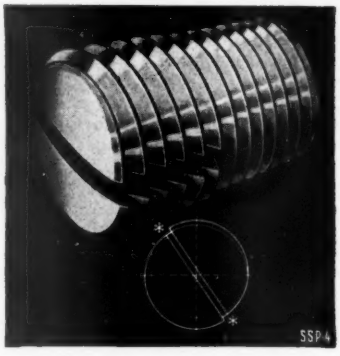
Mount the Model 11 on an offset bracket or directly in the spindle—it will fit nearly any machine tool. When offset it can be used for transferring hole locations from template to workpiece. The image always appears erect and moves in the same direction as the work, making it ideal for checking contours, slots, surface conditions. The Model 11 Microscope is compact, sturdy, rugged—designed for long life, accurate service.

Write today for complete details.

THE PERKIN-ELMER CORPORATION NORWALK, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 156B

Offset Self-Locking Set Screws formerly marketed by the Shakeproof Division of Illinois Tool Works are now being manufactured and sold by the Set Screw & Mfg. Co., 158 Main Street, Bartlett, Ill. These

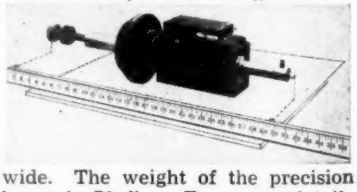


self-locking screws are particularly suited for application where slotted screws are required and are used extensively by manufacturers of automotive vehicles, farm implements and many other products. A catalog sheet on the Offset Screws will be sent to those interested.
Circle Inform-A-Gram No. A45.

Drill Grinder. A new bench model drill grinder that is a single purpose machine with a capacity for ⅛" to 2½" drills is now being produced by the McDonough Mfg. Co., Eau Claire, Wis. The drill grinder can handle

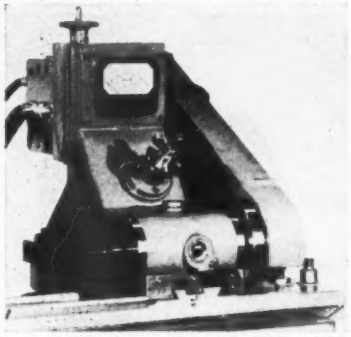
2-lip, 3-lip and 4-lip drills without any change in setup. No collet or jaws are required to hold the drill.
Circle Inform-A-Gram No. A46.

Precision Boring Machine. A new precision Hydro-Borer designed for close tolerance boring yet compact enough for mounting on work holding fixtures or assembly jigs is now available. Its overall measurements are 29½" long, 6¾" high and 5¼" wide. The main housing, which mounts to fixture or machine bed, measures only 9-3/16" long and 3¾"



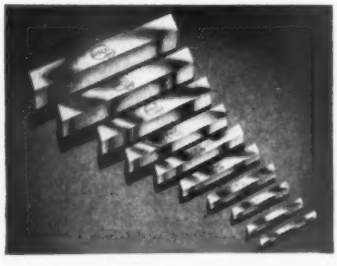
wide. The weight of the precision borer is 70 lbs. For more details write to the Hydro-Borer Co., 1601 E. Olympic Blvd., Los Angeles 21, Calif. **Inform-A-Gram No. A47.**

Thread Milling Machine. A new hydraulic group of thread milling machines has been added to the line of precision machine tools made by the Hanson-Whitney Division of the Whitney Chain Co., Bartholomew Ave., Hartford, Conn. The machines



come in 4 sizes; 4" x 9", 10" x 24", 15" x 30", and 20" x 48", with bed lengths to meet special requirements. The photo shows the hydraulic head, which is one of the outstanding features of this all-hydraulic machine. Detailed description of the machines is available.
Circle Inform-A-Gram No. A48.

Tool Bits. The addition of ground high speed tool bits to its line of cutting tools has been announced by Besly-Welles Corp., Beloit, Wis.

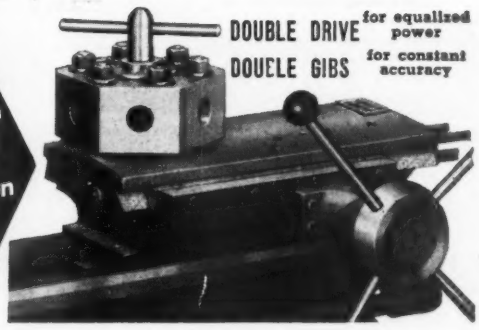


They are available as finish ground bits in 10 sizes of squares from 3/16" to 1", accurately ground to 0.001" for ease in alignment. Full information is contained in Besly-Welles' Bulletin TB-54.
Circle Inform-A-Gram No. A49.

Adjustable Drill. A new adjustable drill designed by the Hayden Twist Drill Co., 8626 Lyndon Ave.,

Detroit 38, Mich., can cut any size hole from 2" to 3" with one set of blades and any size 3" to 4" with a second set of blades.
Circle Inform-A-Gram No. A50.

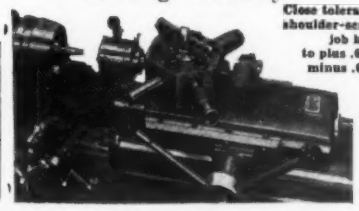
Enco Self-Indexing HEXTURRET
For Lower Production Costs and Speedier Output



DOUBLE DRIVE for equalized power
DOUBLE GIBS for constant accuracy

✓ Custom built to fit all lathes from 9" to 18".
✓ Smooth, sensitive control with Pilot wheel drive through twin gears and racks.
✓ All bearing surfaces hand scraped.
✓ All parts of indexing mechanism hardened, assuring accuracy.

Manufacturers of the most complete line of HEXTURRET BED TURRETS, TURRET TOOL POSTS, and TAILSTOCK TURRETS in the country.



Close tolerance shoulder-screw job held to plus .002; minus .000.

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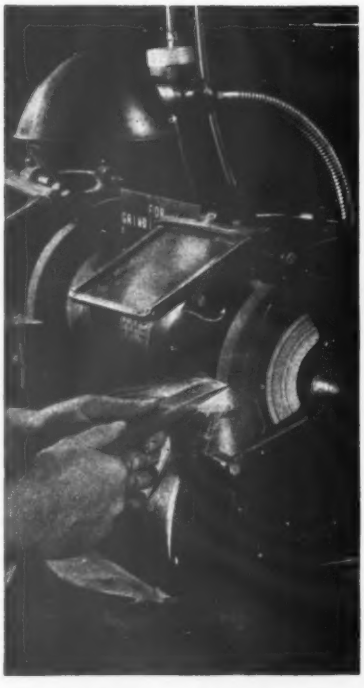

Cut your TOOL GRINDING costs... with wheels engineered for the job!

Choose the *right* grinding wheel for *every* tool grinding job—from the complete line by CARBORUNDUM.® That's the first step toward longer cutting life for your tools... lower maintenance costs in the tool room.

Every tool room grinding wheel by CARBORUNDUM is engineered to do a specific job at the lowest possible cost. You may want faster production of cutting angles, rakes and clearances; or perhaps better finish is more important; or cooler cutting. Whatever features, or combination of features, you may require—there's a tool room grinding wheel by CARBORUNDUM that's *right* for you. Whether you're grinding high speed steel, alloy, or cemented carbide cutting tools, not only these wheels but coated abrasive belts by CARBORUNDUM can help you cut costs.

YOUR CARBORUNDUM DISTRIBUTOR or salesman is ready to help you make the right selection—why not call him today?

Two Helpful Booklets . . . "Maintenance of Alloy and High Speed Cutting Tools" and "Grinding Cemented Carbides"—tell you more ways to cut tool room maintenance costs. They're free—ask for either or both. The Carborundum Co., Dept. T P 81-316A, Niagara Falls, New York.

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REGISTERED TRADE MARK
the ONLY source for EVERY abrasive product you need

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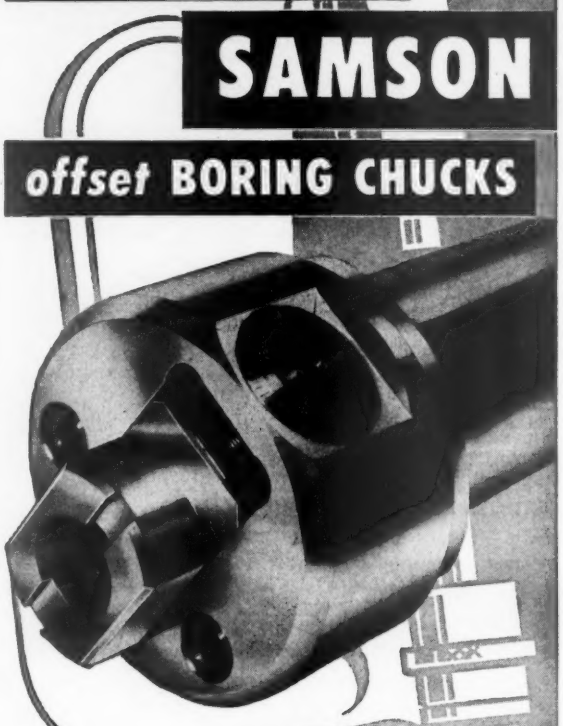
JOB PROVEN!

SAMSON

offset BORING CHUCKS



precision built by precision toolmakers for accuracy and durability in service!

• Designed for quick tool change; equipped with new, extra large dial for precision radial adjustment; machined to provide positive dead centering for rigid, high production milling and boring without removal of chuck; available with a complete selection of interchangeable accessories—these are features that make the Samson Offset Boring Chuck the logical first-choice of the field.

Write for complete information today

ALSO Distributors of famous LAST WORD WHEEL DRESSERS

LAST WORD sales company

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SHEET STEEL HANDLING

can be fast and easy when you use

Verson SHEET FLOATERS

The Verson Sheet Floater eliminates the need for hand separation of sheets and blanks—the hard part of feeding sheet steel to presses, brakes, shears, etc. By magnetic action, the Sheet Floater forces the pieces apart—causes them to fan out for easy handling. This speeds up the feeding operations, reduces operator fatigue, and releases manpower for other jobs. Available in standard and heavy duty models for handling rectangular, round or irregular shaped pieces. Write for further information and prices.

A Verson Press for every job from 60 tons up.

Verson VERSON ALLSTEEL PRESS CO.

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TO BE CERTAIN — SPECIFY G. S. SURFACE PLATES AND ANGLE IRONS

CAST IRON

G. S. Cast Iron Plates are scientifically ribbed and handscraped by experts.

BLACK GRANITE

MICRO-FLAT

"The Gift of Nature"

.00025" or .0001" Surface Precision

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Every Punch Press Operator Needs the "Safety" of a SAFEED Patented

PREVENTS INJURY — SAVES GLOVE COSTS

Feeds ferrous, non-ferrous strip or sheet . . . faster, safer. Use for stamping, shearing. Right or left hand non-slip fitted grip, self-adjusting. Sturdy, hardened work surfaces. FULLY GUARANTEED.

Write today Early delivery.

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IMPORTANT NOTICE

The Genuine MAUSER VERNIER CALIPER IS NOW MADE OF STAINLESS STEEL THROUGHOUT

AND THE FOLLOWING IMPROVEMENTS HAVE BEEN ADDED

• HARDENED PHOSPHOR-BRONZE adjustable gib retains accuracy

• SPECIALLY LONG VERNIER to read thousandths

• 3 GRADUATIONS - 1/1000" - 1/128" 1/10 mm in back

$14.75 PPD

Request illustrated folder showing complete line of MAUSER Toolmakers Calipers, Height Gages, Bevel Protractors and Tool Stands.

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Here's Turning Point Protection For You

The men of skill—America's modern machinists deserve the best . . . the most practical . . . the handiest . . . the safest machinery guards. Skilled machinists in the plants of our hosts of satisfied customers guard the *turning points of their machinery with Dilley Guards.*

Look at the picture. Note the tru-vision thru these sturdy plastic guards . . . magnetically-instantly positionable on any machine. Let today be your turning point to proven . . . effective . . . modern guarding. Literature on request, or order six 8"x10" units today.

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Tel.: SW 1-4849

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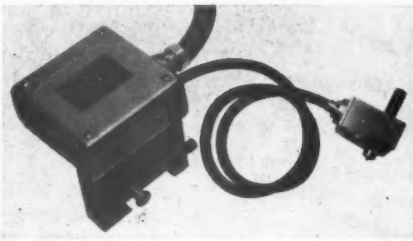
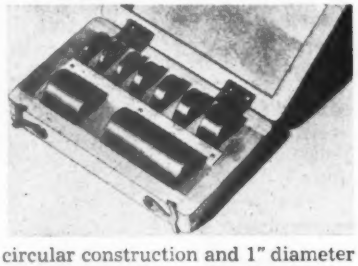
An Industrial Diamond Turner is now available through the efforts of the Industrial Diamond Co., 2392 Wolcott, Ferndale 20, Mich., in co-



operation with the Corr Instrument Co. The turner is a compact self-contained electro-mechanical device designed to automatically index the dressing diamond by positive, precise increments.

Circle Inform-A-Gram No. A51.

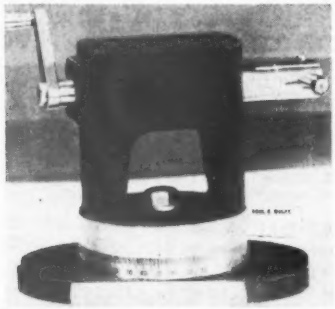
Swedish Circular Gage Blocks. Illustrated is a standard 9-piece set of Swedish circular gage blocks which makes up into 331 combinations of 50 millionth accuracy. The



circular construction and 1" diameter of the gages afford a considerable increase in gaging service. For further information write to the Transocean Trading Co., Dept. T, 6453 Santa Monica Blvd., Los Angeles 38, Calif.

Circle Inform-A-Gram No. A52.

The Phelco Angle Dresser is a precision built instrument for dressing grinding wheels and has such new and unique features as the ability to dress both sides of a wheel without disturbing the set up. The



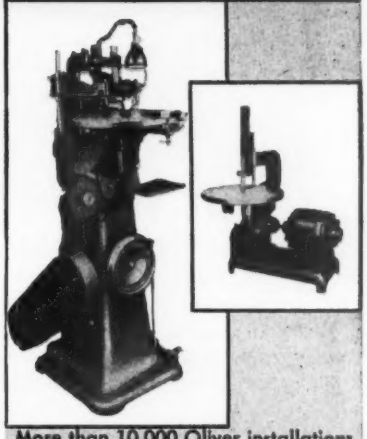
dresser also can be used on both cylindrical and surface grinders by means of a slight adjustment. Further information on this efficient tool is available from Phelan Engineering Service, 1913 West Magnolia Blvd., Burbank, Calif.

Circle Inform-A-Gram No. A53.

Get Precision Perfection

Slash Costs with

OLIVER DIE MAKING MACHINES



More than 10,000 Oliver installations are saving up to 60% in time and labor on jobs where efficiency, accuracy and speed are demanded. Skilled labor is not required for sawing, filing and lapping the proved Oliver Way.

Oliver's 40 years of experience proves without a doubt that it is quicker and cheaper to saw out a piece than to drill and chip it. Oliver Die Makers do all sawing, filing and lapping operations with ease, economy, and speed. Many Oliver Die Making Machines have been in continuous use for more than 25 years. Let Oliver of Adrian save dollars for you in making less-expensive dies, gauges, templates and cams.

OLIVER of ADRIAN

OLIVER DIE MAKERS
Available in 5 Models

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

***Write Today For Complete Technical Data on* OLIVER DIE MAKERS**

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AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
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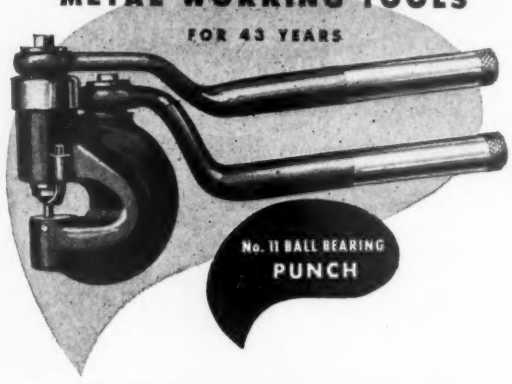
WHITNEY-JENSEN
METAL WORKING TOOLS
FOR 43 YEARS



● Portability and power are combined in this punch by use of the ball bearing screw principle, which enables us to pack 14,000 lbs. of punching pressure in a tool weighing only 9½ lbs. Capacity is ⅜" hole thru ¼" mild steel. Base is available for fixed-position use on bench. *Write for our new Catalog.*

WHITNEY METAL TOOL COMPANY
724 FORBES STREET • ROCKFORD, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 160A

ALL INFORMATION, METHODS, AND IDEAS NEEDED TO PRODUCE *BETTER TOOLS AND DIES*

Practical Data on Popular Analyses of Tool Steels, their Selection, Heat Treatment, and Use

in the Revised, Enlarged SIXTEENTH PRINTING of this

TOOL and DIE STEEL HANDBOOK

By Palmer and Luerssen

Here's the BOOK OF ANSWERS for every man responsible for tools and dies. Shows you how to increase your company's production from present equipment—how to reduce toolmaking trial and error, conserve tool steel, avoid die troubles, simplify heat treatment. Gives complete working information on everything from selection of the right steel to heat treating methods and equipment, hardness and toughness testing, latest data on high speed and hot work steels. 564 pages, 355 charts, photos, diagrams give you facts on: how design affects heat treatment, hardenability tests, time required to heat different tools to required hardening and drawing temperatures. furnace atmospheres, quenching, tempering, trouble-shooting.

INCLUDES 70-PAGE ALPHABETICAL SELECTOR, BOUND RIGHT IN THE BOOK, SHOWING WHICH STEEL TO USE FOR ALMOST EVERY TOOL AND DIE. Use this book to train new men and upgrade skilled men.

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CIRCLE INFORM-A-GRAM KEY NO. 160B

. . . Piercing, from page 128.

Often, of even greater importance is the fact that a piercing job can be put into production days and weeks ahead of the time normally required in making up dies by other methods. When any single job is completed, the punches, dies or complete units can be removed from the die plate or die set and re-used in making up another job. Therefore, these parts become stock items in the tool room.

Money savings in die costs and production costs by such methods as Whistler's can have a startling effect on product sales pricing and, for the contracting fabricators the difference between job profit and loss.

A New Wrinkle Eliminates Wrinkles

A new wrinkle in hydropress operation at TEMCO Aircraft Corporation virtually eliminates wrinkles in pressed aluminum parts.

Officials figure the inexpensive gadget — called an over-press cover plate — nets the Dallas, Texas firm a $5,816 annual saving by making hand-finishing an unnecessary aftermath to hydropressing. Designed by a hydropress leadman, William T. Phillips, Grand

Prairie, Texas, the system merely substitutes a second trip under the hydropress for lengthy hand-forming with mallets.

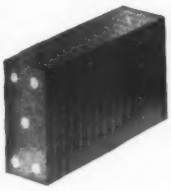
Flat work is still placed on dies and hydropressed once in normal fashion. It comes out of this operation shaped generally to fit the die, but seldom to fit inspection standards. The reason is that hydropressure is not delivered directly to die sides. As a result, wrinkles from top pressure form on part sides, and side joggles (offsets) come out imperfect.

These wrinkles formerly were smoothed by hand. Now Mr. Phillips' overpress plate performs the same job when it accompanies the part and die on a second quick trip under the hydropress.

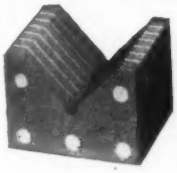
The plate consists of a flat piece of .125 aluminum, shaped to conform to the die top. This plate lies on top of the part, between it

. . . *Continued on page 162*

MAGNETIC CHUCK PARALLELS and V BLOCKS



No.	Size	Matched Pair	No.	Size	Matched Pair
IP2	1x2x2	$16.50	IV2	1¾x2½x2	$22.50
IP3	1x2x3	19.50	IV3	1¾x2½x3	33.75
IP4	1x2x4	22.50	IV4	1¾x2½x4	45.00



Price includes Hardwood Box.

CROSS SECTION

- Positive, mechanical lock, non-shift laminations.
- Spring-temper, phosphorus bronze and mild steel laminations.
- ⅛" end laminations welded and ground square.
- Five silicon bronze dowels welded to end plates.
- Ground parallel and square.
- "V" in V block ground parallel to base and centered.

Unconditionally Guaranteed

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The Royal Magnetic — Imperator of Accessories

Mfg'd. by Wires & Son Machine Products, Inc.

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Grobet RIFFLERS

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Sold Through Leading Supply Houses.

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THE KOCH TEST INDICATOR

IS THE ONLY TOOL MAKERS INDICATOR ON THE MARKET WITH TWO WORKING ENDS, FOR PRECISION WORK, ONE END TO TEST OUTSIDE SURFACES, THE OTHER INSIDE.

WHAT EVERY TOOL ROOM TOOL MAKER OR MACHINIST NEEDS.

Plunger moves away from, instead of against the lever, protecting delicate parts from sudden or excessive jolts. Each graduation on scale represents 1/1000" movement of plunger. $7.50 plus postage.

Positive-Lock SURFACE GAGE

Drawbolt has positive lock to prevent slippage. Spindle: 9"x5/16". Block: 3¼"x2½"x1" with 90° angle groove in base. Surface Gage is precision ground. $5.75 plus postage.

Ask your dealer for these tools and buy through him. If he cannot furnish them, Write to us.

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Standard Models of GRAYMILLS Coolant Pumps and Complete Systems

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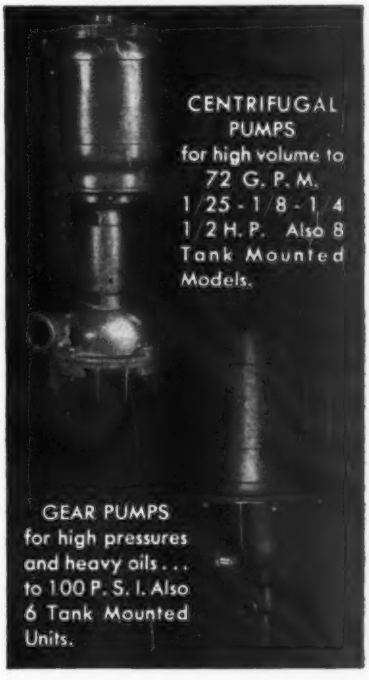
CENTRIFUGAL PUMPS
for high volume to 72 G. P. M.
1/25 - 1/8 - 1/4 1/2 H. P. Also 8 Tank Mounted Models.
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for high pressures and heavy oils . . . to 100 P. S. I. Also 6 Tank Mounted Units.

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Industrial Distributors Stock Standard Models

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CIRCLE INFORM-A-GRAM KEY NO. 161D

. . . A New Wrinkle, from page 160

and the rubber face of the hydropress. Two steel rims, or flanges, are hinged to the top plate by means of metal attach strips which are riveted to rims and top plate. These rims hug the sides of the die and the part it is forming.

Rim and top plate are joined to form a right angle, but the flexible attach strips allow the rims to flare out to an obtuse angle in order for the entire over-press platetop and rims to be placed over the part and its die after the first hydropressing. Pressed again, a standard pressure is brought to bear on the part's sides by means of the rigid steel rims.

Rims prevent buckling and equalize pressure. They, in effect, are a forming die on the outside of the part which gives hydropress force more specific direction.

To date TEMCO has made over-press plates for about 175 dies, at a total cost of approximately $400. The over-press plates have been used to form aluminum up to a weight of .040.

WALTON *SPECIALIZED* TOOLS CUT COSTS IN METAL WORKING

Consider your costs of time, labor, and lost production due to difficult removal of broken taps, screws, studs, and pipes. On many jobs these costs are the difference between profit and loss. Walton Specialized Tools will help you recover some of these losses.
Likewise, tool changes can build up excessive costs. The Walton-American Tool Holder is a cost reducer. Its adjustable, swivel head may be set for straight, right offset, or left offset positions. Many holders in one immediately at hand at the machine. No lost motions.
Write for the Walton Tools Catalog #38. It will tell you how to reduce your costs. Liberal free trial offer on all tools. Sold by leading industrial supply dealers.

SAVE TIME
SAVE LABOR
KEEP PRODUCTION MOVING

THE WALTON COMPANY, HARTFORD 10, CONN.

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You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES No. 6 to 1" N.C. In all S. A. E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work *now*—save money too!

HEIMANN MFG., CO. • URBANA, OHIO

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3338 Payne Ave., Cleveland, O., HEnderson 1-8644. External Cylindrical Lapping Machines, Special Machinery, Tools, Dies, Jigs, Fixtures.

Milling Machine Converted Into External Grinder

A novel conversion job by Ace-Central States Machine Tool Company, Detroit, changes a milling machine into an external grinder, saving as much as two days on work of large diameter. By this method, slots can be ground as accurately as holes on a jig borer. Indexing is done by a simple fixture made by Ace-Central States, visible in the photograph. Shown on the machine is a master index ring for a special broaching machine, one of twenty designed and built by Ace-Central for broaching Christmas-tree blade slots on British jet engine stator rings. The set-up handles diameters up to 48 inches. Ace-Central designs and builds special machines and tooling for heavy industry.

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TRACING TEMPLATE
COVERING 263 ITEMS
IN FULL SCALE

QUARTER TURN SCREWS • SOCKET SHOULDER SCREWS • JIG FEET (three types) • FIXTURE KEYS (six sizes) • LATCH BOLTS (std. & long) SPHERICAL WASHERS • SPHERICAL FLANGED NUTS • STRAP CLAMPS (two types) • HARDENED NUTS & WASHERS • FLANGED NUTS N/C & N/F • CUT THREAD STUDS • TEE-NUTS (twelve sizes) • COUPLING NUTS • ADJUSTABLE STEP BLOCKS • STAR TYPE HAND KNOBS • HEXAGON TYPE HAND KNOBS • KNURLED HEAD SCREWS

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Northwestern
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WE'VE HELPED
SHOPS SAVE
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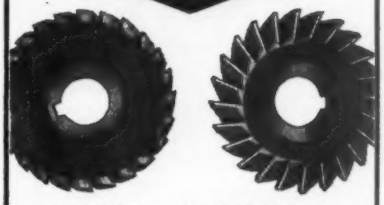

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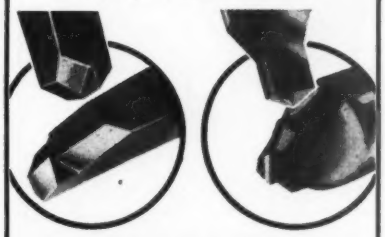
CUTTERS RECLAIMED

YOUR CUTTING TOOL COSTS can be cut by converting worn and obsolete high speed and carbide cutters for other jobs. Let us help you set up a tool salvage program.



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HEAT TREATING
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Removing scale and polishing heat-treated dies and tools are virtually eliminated with PARKER'S development of PHOENIX BRAND NON-SCALING COMPOUND. Used for many years in PARKER'S own plant, this product is now being offered, *for the first time*, to the industry at large. Application of this compound *(a powder, not a salt solution)*, according to simple, easy directions on the label, prevents decarburization, scaling, pitting, surface film and excessive discoloration in the *hardening* and *annealing* of steels. The most intricate engraving details are *scale-free*, clean and smooth after heat-treating. Many hours spent in polishing are eliminated. These unretouched photographs illustrate the amazing results you can expect.

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WITH COMPOUND

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CIRCLE INFORM-A-GRAM KEY NO. 164

Semiautomatic Piston Grinding Machine

A complete "packaged unit" for piston grinding, known as the new 6 x 8″ Semiautomatic Piston Grinding Machine, has been announced by a prominent manufacturer.

Because of its fast, accurate action, this new machine provides the means for obtaining real economy in grinding elliptical automotive and aircraft type pistons to fine limits of size and finish. The machine can be specially arranged for grinding complex skirts where the degree of relief varies from the top to the bottom of the skirt.

The machine is a heavily built plunge grinder with a time-tested wheel spindle unit and a proved cam generating mechanism of extreme endurance. This mechanism gives the special motion to the workpiece for grinding required skirt form.

Contributing particularly to the productivity of the machine is the fast, precise action obtained from the hydraulically actuated "revolving feed screw" wheel feed mechanism. This provides hydraulic features for rapidly traversing the wheel head, and mechanical micrometer screw feed during the grinding feed stage to assure finest accuracy in sizing.

Very little actual operating effort is required in running the machine. This allows the operator to devote the major portion of his attention to loading and unloading duties. For instance, wheel truing is done automatically by a wheel guard type truing device on the touch of a push button. The automatic grinding cycle is started by movement of a single lever.

For speeding set up and operation, all controls for feeds and speeds are grouped at the operating position on the front of the machine. For simplifying maintenance functions, all pumps, motors, relief valves, and flow control valves, are mounted in accessible locations on the outside of the machine.

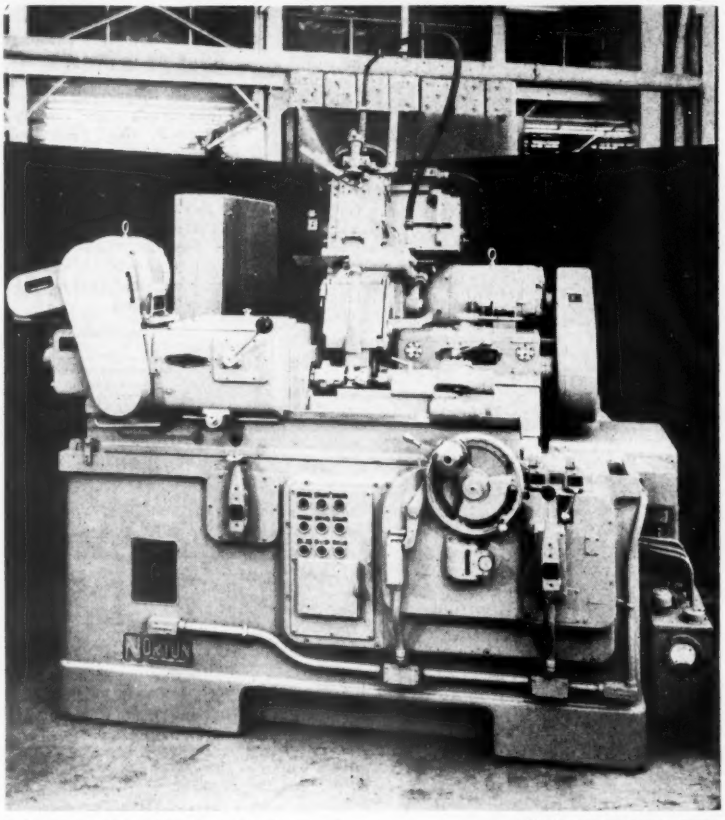

Photo courtesy Norton Company

... Electrolimit Measuring System, from page 125

greatly to the machine's versatility. Operation of the head assembly vertically is conveniently controlled by push buttons. An automatic interlocking mechanism clamps the head positively in position on the column after motion starts.

The 2E Jig Borer has electronically controlled milling feeds infinitely variable from 1" to 15" per minute. Rapid power travel of 60" per minute is also provided. There are eight selective spindle feeds ranging from .0005" to .015" per revolution, both up and down. Twelve spindle speeds ranging from 37 to 1800 rpm. are provided through a gear box and four speed motor.

Ample working space is provided with a 22" by 44" table: travel is 36" longitudinally and 22" transversely. Maximum height between table and spindle end is 27". Special columns 6" or 10" higher than standard can be furnished, increasing the machine height accordingly.

Other features included in the 2E Jig Borer are: centralized control zone with push button control box adjustable for height, open side design for handling large work pieces, precision hand scraped bearing surfaces, automatic pressure lubrication and telescoping chip guards on all bed and carriage ways.

"Soft" Metal Parts Deburred

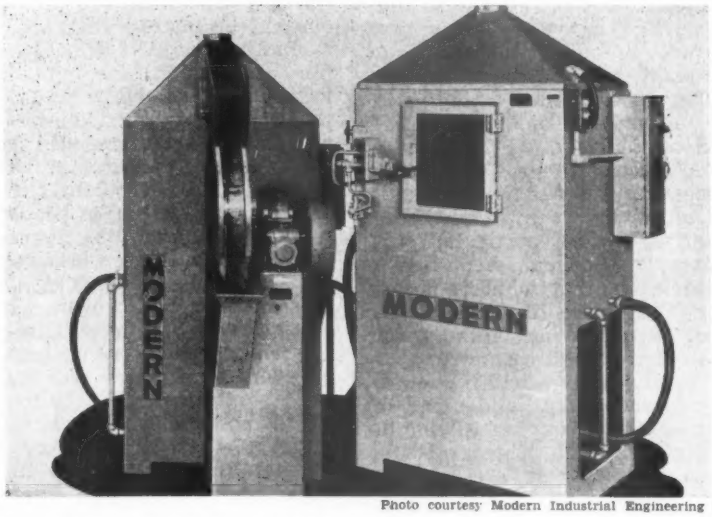

Photo courtesy Modern Industrial Engineering Co

Shown above are the two standard Maizo Blast machines used for the rapid deburring of "soft" metal parts. Model MA-24 (at left) has a ferris-wheel type fixture for continuous blasting of small parts. Larger work is handled in Model MA-1 (at right) with the work rotating in a fixture on a fixed axis. It can be supplied with 2, 4 or 6 blasting guns depending on the nature of the work handled.

Fast production deburring of "soft" metal parts using either a continuous rotating process for small parts or a stationary clamping arrangement for larger units, is possible with the two standard Maizo Blast machines. Both standard machine types are designed to remove light burrs from metals in the range of aluminum to mild steel. In both models, maize, or a similar "soft" material, is blasted against the parts under factory airline pressure. These machines are specially suitable to deburring parts that would be damaged by tumbling.

A ferris-wheel type fixture rotates continuously between two reciprocating blasting guns in Model MA-24 at the rate of approximately one revolution every five minutes. The revolving wheel carries 16 to 24 pieces in holding wires bent to suit the part and yields a production rate of 192 to 288 pieces per hour at 100 percent efficiency. Higher production rates can be obtained, depending on the size of the part. A friction-driven slip clutch permits the operator to retard rotation if necessary. Speed of rotation can be varied as required by hardness of the parts being blasted by changing the drive pulley.

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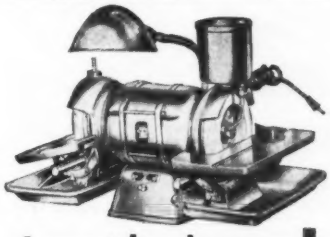

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GRINDERS

CIRCLE INFORM-A-GRAM KEY NO. 165B

Competition of European Manufacture Calls for Wise Machine Tool Planning, F. S. Blackall, Jr. Tells Electrical Engineers

While European manufacturers of durable goods are rapidly reaching the point where they can make an effective invasion on our domestic markets, this country must increase productivity by developing and applying the best possible tools for production. Frederick S. Blackall, Jr., president and treasurer, Taft-Peirce Manufacturing Company, Woonsocket, Rhode Island, and president of The American Society of Mechanical Engineers, made this statement before the American Institute of Electrical Engineers Conference on Machine Tools.

Improved design and cost reduction are paramount obligations to maintain industrial leadership, he told the engineers' group. "The benefits of the joint standards developed by our engineering societies, in cost reduction, simplification, improved design and interchangeability of

product, not to mention their great gifts to public safety and the national defense, are immeasurable," he said, warning, "It is important that standards be drawn in such a manner that they will be a boon to all, and not devised to meet the needs of only one specialized group or another, no matter how important or powerful."

Mr. Blackall deplored the "present quality of electrical standards in the machine tool field due to the parallel development of Electrical Standards by the Joint Industry Conference and National Machine Tool Builders Association." He called on technical staffs of machine tool consumers and machine tool builders to join in eliminating this situation which is wasteful and costly to builder and consumer alike.

"I often wonder if there is not, on occasion, too much of a technical and theoretical bias in the establishment of certain standards, and a callous disregard for the dollar sign. The manufacturer is impelled to produce the optimum result at the lowest possible price. It seems wasteful to him to demand two or three hundred dollars extra from his customer in order to provide electrical apparatus which will do the same job—in a different manner, but in most cases no more safely, not as conveniently, and no better.

"The influence of the automotive industry on machine tool design has been great and constructive, but in catering to this important customer, many machine tool builders have rather gone off the deep end in emphasizing massiveness, a multiplicity of controls, and a degree of automaticity which is practicable only in the mass production industries. The automobile manufacturer has demanded these changes for his particular purposes. The error has been in the assumption that what is necessary to automotive production will probably be suitable for everybody else," he stated.

"A tremendous field is open to the machine tool builder and to the electrical supplier in simplifying the design of general purpose tools. There are a great many operations, even within the mass production industries, which can be performed just as rapidly on a general-purpose machine tool as they can on one of the more complex models. In such cases, many of the more expensive features simply are not used, but they have to be paid for," Mr. Blackall pointed out.

"There is, of course, a place for the machine tool which is the ultimate in ruggedness, high speed, variety or special features, and automatic controls; but there is also an equally important place for the general-purpose machine tool, designed for average conditions.

"In standardization and fundamental design, engineers should recognize that conformity to generally accepted principles should be the servant and not the master of creativeness and invention," he said.

. . . Band Tools, from page 57

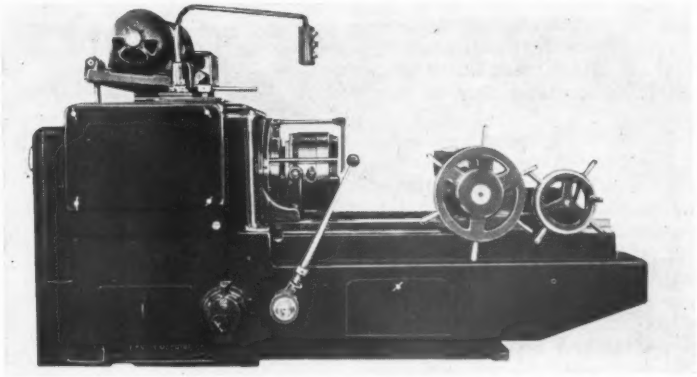
fpm, depending on type of material being cut. As with line grind bands, material thickness has little bearing on velocity and exclusive of a few applications the diamond band functions well at velocities of from 5,000 to 6,000 fpm. Nominal widths are ¼", ½", ¾" and 1", all have a nominal pitch of 10 inserts per foot and back of bands is .025" thick.

The diamond tooth band does not pierce, shear or scrape but actually flakes as would a sculptor working his marble. It is most essential that vibration be held at a minimum and both machine and cutting tool have been engineered to that effect. A coolant is a must and the gullet in this band is designed primarily to trap and guide the coolant through the work. The most efficient coolant is water and it should be kept cool if necessary by occasional freshening. Lubrication is definitely an undesirable factor. Rust inhibitors are however recommended as a protection for the machine. The functions of the coolant are as a general rule solely to keep the work clean and the diamond points free of flakes, otherwise the diamonds would clog and cease cutting. However, when cutting glass and most vitreous materials keeping the coolant at an even temperature will minimize shattering. The gullet of the diamond band acts as a pump impeller to draw the coolant through the work and a large capacity reservoir is provided in the basic machine design for filtering the sludge.

Feeding pressures such as used on metals would be destructive to the diamond tooth band, it would actually stop cutting and the heat generated would ruin it in a matter of minutes. In fact, feeding pressures should rarely exceed five pounds and contact pressure feeding produces the fastest and smoothest cut. With little experience, the operator can hear the cutting action as well as see it and feel it. Last but not least, a free-moving feeding fixture is essential to good finish and smooth cutting. Fixture feeding provides the band with a much greater amount of side cutting efficiency than possible with any other type of band saw blade. Any lateral movement of the material will cause undesirable lateral cutting.

New Threading Machine Built for Heavy-Duty Precision Work

A new threading machine for heavy-duty precision threading on large diameter work has recently been developed by the Landis Machine Co., Waynesboro, Pa.



At present this machine, called the "Landmaco," is being built only in a single spindle model and is furnished with or without the leadscrew attachment.

The machine will cut bolt threads from 1½" to 6⅝" in diameter and pipe threads from 1" to 6" in diameter, up to 29" long with leadscrew and 30" without leadscrew. Pitch capacity ranges from 2 to 24 threads per inch.

A single gear shift lever is provided for a rapid speed change of 25% for any given spindle speed as determined by the speed change gears in use. Three pairs of speed change gears provide 12 spindle speeds ranging from 9 to 152 revolutions per minute.

The Landmaco is equipped with either the 4" standard rotary head or the new 6" (6-chaser) Lanco Head. Both die heads are of sturdy construction and provide a rigid support for the chasers, a basic element for accurate well-formed threads.

The carriage front or vise is of a new design principle and as such assures proper work alignment under gripping pressure and gives 60% more gripping efficiency than previous vises.

More complete information may be secured by requesting Bulletin H-45. **Circle No. D7**

INDUSTRIAL NEWS

Spiral Step Tool Company. With the acquisition of the carbide form tool grinding equipment and personnel of Corlett-Turner Company, Spiral Step Tool Company of Chicago makes its entry into the carbide form tool field on a broad production scale.

While Spiral has been primarily engaged in the cutting tool business for the past fifteen years, they have been in the carbide form tool business to a limited extent. With the acquisition of the Corlett-Turner equipment and grinding method for grinding carbide, Spiral has expanded their facilities to the point where they can meet all demands for screw machine cutting tools.

The transfer, which was announced recently by Mr. George O'Dell of Spiral, is effective immediately. According to Mr. O'Dell, Spiral will provide their customers and former customers of Corlett-Turner with the same dependable source for carbide form tools, with particular emphasis on the design and production of single and multiple insert circular tools as well as dovetail tools. The company will maintain a re-sharpening service, available at nominal cost to customers not having diamond wheel grinding facilities.

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HUEBNER PUBLICATIONS, INC.
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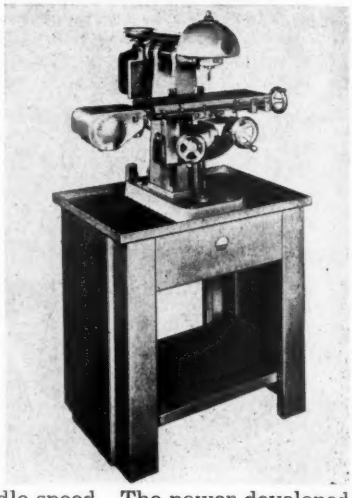
Benchmaster Designs Accessory Power Feed for Hand-Saw Mills

A new accessory power feed for use on its hand-screw mills has been announced by Benchmaster Mfg. Co., Gardena, Calif. The accessory is designed for mounting on the end of the table with no special machining required for attachment other than the drilling and tapping of two holes.

With this accessory power feed, four table speeds are available; 1.2, 2.1, 3.2 and 4.5 inches per minute. Travel is reversible, permitting milling in either direction and automatic stops are adjustable for any desired length of stroke. Manual operation is unaffected through incorporation of a disengaged lever.

The unit weighs approximately 10 lbs. and is 4½" x 5½" x 8". It is housed in lightweight alloy castings with a worm and gear unit driven by a small, independent electric motor operating on 115 V.A.C. This permits table operation which is free of spin-



dle speed. The power developed exceeds milling capacity of the machine.

Literature on the accessory will be happily furnished by Benchmaster upon request.
Inform-A-Gram Key No. D9.

School of Aviation Medicine Uses Jeweler's Lathe

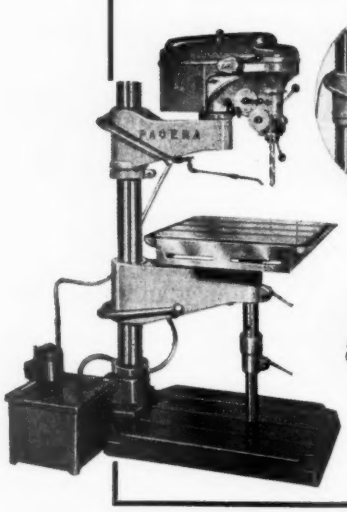
Photo courtesy Louis Levin & Son, Inc.

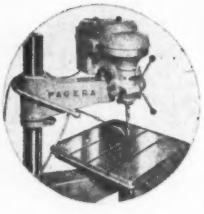
U. S. Air Force School of Aviation Medicine at Randolph Field, Texas finds the Levin's Jeweler's type precision lathe important machine shop equipment.

Delicate electrodes for special recording equipment turned on the Levin lathe are so tiny that work in progress must be observed through a microscope.

The electrodes are used in the Department of Neuropsychiatry in experiments involving electrical potentials from single tissue cells or nerve fibres.

Extreme sensitivity of the Levin lathe makes it a most useful machine for a research laboratory. Progress of turning is observed through a microscope.





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Cleveland Firm Expands

Moch & Merryweather's Cutting Tool Manufacturing Division, under the management of D. M. Hallier, now occupies quarters with the Used Machinery Division in Euclid, an eastern suburb of Cleveland, Ohio. Managing the Used Machinery post is E. J. Kossuth.

Available at the Euclid plant is a complete service on circular saw blades. In addition, Motch & Merryweather is equipped to handle the accurate, burr-less cutting off of metal shapes, large and small, ferrous or non-ferrous, at the suburban location. Also housed in the Euclid plant is the Cutting Tool Sales Division.

The firm's new Machinery Distributor and Sales Divisions are located in Downtown Cleveland while the Machinery Manufacturing Section is housed on the city's east side.

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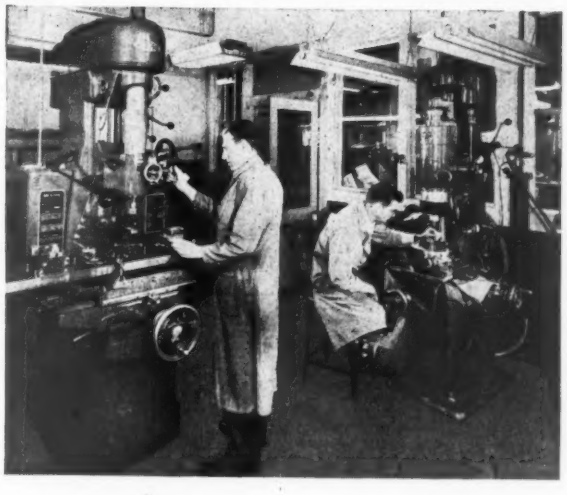

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CIRCLE INFORM-A-GRAM KEY NO. 169C

. . . Automatic Heat Treat, from page 58

to the shipping department so that an order for the particular lot of fasteners can be pulled and processed while the lot is being heat treated. (SPS will eventually install telescribing stations both at the weigh station and in shipping to transmit this information.)

After weighing, a hydraulic tilt-stand dumps the screws directly from the weigh stand into a short section of shaker conveyor. The shaker feeds the first wash. Here, on a steel belt, the screws ride through a hot alkali rinse that strips them of accumulated oil, grime and dirt. The cleaned screws drop out of the wash onto a steel-trough shaker conveyor. This shaker runs the screws into the hardening furnace and onto the steel belt that runs the entire length of the 30′ chamber.

In the hardening furnace the screws are brought into perfect solution at a temperature of about 1600° F. The controlled atmosphere that fills the furnace (the heating gases themselves flow inside the radiant tubes) excludes oxygen and other reactive elements, and prevents decarburization and scaling.

At the end of the hardening furnace, the parts drop directly into an 8′ deep quench pit. Rapid quenching at critical temperature by a special-type oil assures fine grain steel of high hardness. Over 5000 gallons of quenching oil are recirculated through a cooling tower on the plant roof. The oil re-enters the quench tank through powerful jets that thoroughly agitate the oil and provide an even quench.

A flighted, inclined steel belt conveyor pulls the quenched parts from the pit, drops them on a woven steel belt conveyor that feeds in sequence the second wash and the tempering oven.

The second wash removes quench oil, and the tempering oven lowers screw hardness from about 50 Rockwell (achieved through heat treating) to the desired level. Tempering —the longest single operation—pretty much controls the speed of the production line.

At the end of the tempering oven, the screws again drop into an oil-filled pit—this time a shallower pit for oil-proofing the finished product. A flighted, inclined steel belt conveyor pulls out the rust-proofed screws and drops them on a vibrating screen conveyor. This shakes out excess oil and deposits a finished product into waiting "C" bins at the end of the line.

The continuous, fully mechanized sequence ends here at present. But future additions are planned that will mechanize the remaining processing of the screws—inspection, packing, and transfer to the shipping platform.

. . . Multiple Drilling, from page 45

tioned under the drill head, Figure 2, the entire assembly is raised in rapid advance, slow fed for the drilling operation and lowered in rapid retract feed to a position where riser pins in the raising fixture mechanism disengage the castered fixture, permitting it to be carried out of the machine.

This vertical feed arrangement for the part is accomplished by a cam-fed motor-driven linkage. The motor drive for the linkage is at the side of the machine and includes a magnetic clutch and double reduction worm gear drive. Two linkage bar arrangements are included in each of two machine column sections and thus provide the necessary stability to raise the heavy part and fixture assembly.

The tapping machine section, Figure 3, has a similar cam-fed, motor-driven linkage. In this head, however, vertical spindle feeds are provided to tap the holes in the ring gear after it is raised to position under the tapping head. Each tapping spindle has its own lead screw. Special floating tap drivers protect each tap from damage.

In the tapping machine, the part and fixture assembly is raised to a stop and the spindles advance by means of lead screws on each spindle. Then the tapping head drive motors reverse, causing the spindles to retract and the part is lowered to the machine table by the cam feed lift mechanism.

Power Drive

The power drives for the drilling and tapping machine sections are similar in design. The drive for the drilling machine, Figure 4, includes four flange-mounted 25-hp. motors. These motors drive a bull gear, mounted on ball bearings on a center post, through a double reduction spur gear drive. The bull gear drives spur gears mounted on the end of each drill spindle.

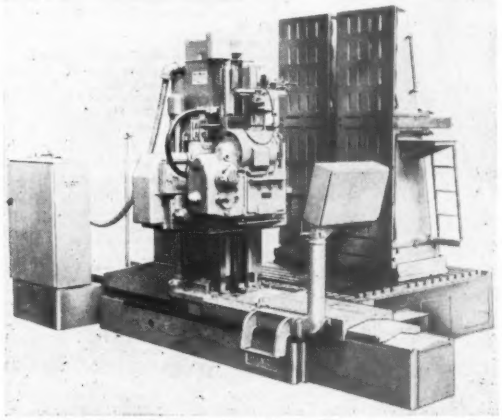
To cut down starting load requirements, the motors in the machine combination are started in sequence. First the coolant motors are started in sequence, then the drill motors and finally the tap motors.

Coolant Supply and Chip Considerations

The coolant supply for the drilling machine is located in the base. Four coolant pumps direct coolant to each drill through flexible tubing. Adequate chip clearance is provided above the bushing plate in the drill head. The chips are removed with a hook from the machine when they reach adequate proportions. The four riser pins in the lifting table, which engage the castered fixture extend above the table surface so that chips do not interfere with the lifting sequence.

Pratt & Whitney Presents Automatic Electric Tracer

Another new automatic electric tracer controlled milling machine has been developed by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn. Called the Keller type BG 21, this machine has been specifically



designed for electric tracing. However, it also can be used as a regular milling machine.

The Keller BG-21 can be obtained in 5 different sizes ranging from 4′ x 2½′ up to 10′ x 4′, plus special 2-spindle models. Rapid traverse up to 250″ per minute and automatic chip conveyors are standard on the larger models.

Circle Inform-A-Gram Key No. D8

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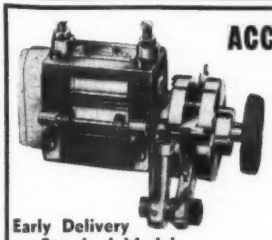

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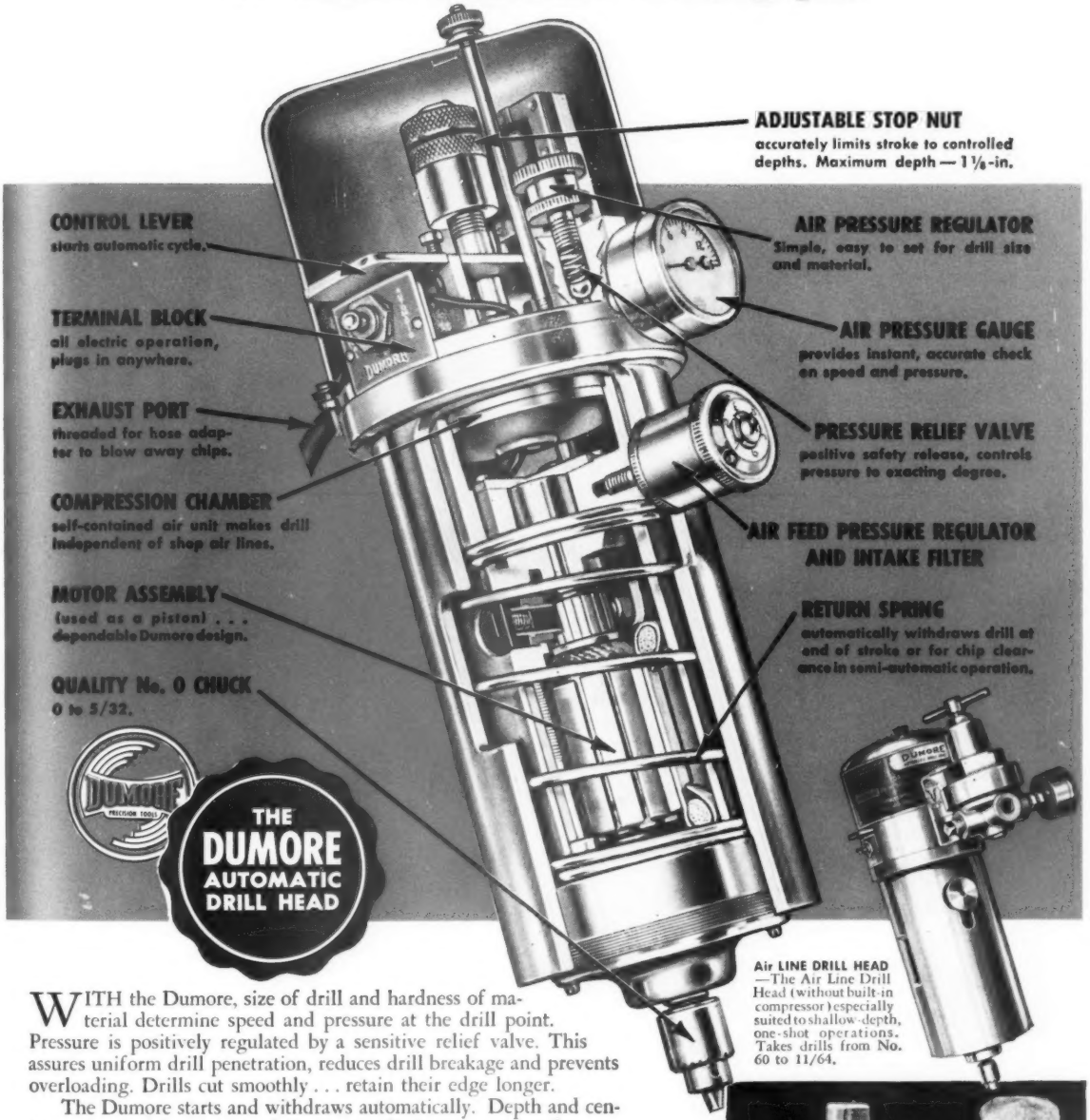
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